

**FORT LEWIS**  
**CROSS CONNECTION CONTROL PROGRAM**

**SECTION 8: MAINTENANCE MANUALS**

**INSTALLATION  
MAINTENANCE,  
AND TEST  
INSTRUCTIONS**

**BEECO<sup>®</sup> *Aergap*<sup>™</sup>  
MODELS FRP I AND FRP II  
REDUCED PRESSURE  
PRINCIPLE  
BACKFLOW PREVENTER  
FRP I,  $\frac{3}{4}$ ", 1"  
FRP II,  $\frac{3}{4}$ ", 1",  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ ", 2"**

**MODEL FDC  
BACKFLOW PREVENTER**

BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

## GENERAL INFORMATION

Beeco® Aergap™ Model FRP Reduced Pressure Principle Backflow Preventers and Model FDC Double Check Valve Assemblies are designed and manufactured to give long, troublefree service in safeguarding public and private water systems from pollution or contamination caused by cross-connections. However, to insure proper operation, each device should be tested at least annually (or as prescribed by authorities having jurisdiction), and after each repair operation.

Rubber parts, which include valve discs, relief valve diaphragms and small o-rings should be replaced at least every five years or as prescribed by authorities having jurisdiction (see replacement valve kits).

Special test kits and repair tools are required to repair and test these devices. Model FRP and FDC repair tools and test kits are listed in this manual.

If service by the manufacturer is preferred,

factory-trained field service engineers are available. Contact Hersey Total Service at (214) 423-7359 for details.

## PARTS ORDERING INSTRUCTIONS

Please state name of part, part number and quantity required. If applicable, also state model, size and serial number of device for which parts are intended.

## PARTS LISTS ACCURACY

Each entry has been checked for accuracy. However, should any question arise regarding the proper description, part number, quantity or list price of any item or items listed in this parts catalog, Hersey Products Inc. reserves the right to determine the applicable description, part number, quantity or list price.

## HERSEY LIMITED WARRANTY

Hersey Products ("Hersey") warrants for a period of one year from the date of sale (warranty period) that the product(s) sold hereunder are free from defects in material and workmanship. Our obligation under this warranty is limited to repair or replacement, or, at our option, we will repay the price paid for the product(s), plus any transportation charge paid by the purchaser. In the case of replacement, we will pay the transportation charges to the location of the defective product. We must be given the opportunity to inspect any product you believe to be defective. To make a claim under this limited warranty, contact Hersey Customer Service.

THERE ARE NO OTHER WRITTEN OR ORAL WARRANTIES. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE DURATION OF THE LIMITED WARRANTY SET FORTH ABOVE.

Hersey does not assume any other obligation in connection with the sale of the product(s) by purchaser.

This warranty shall not apply to any product(s) which have been installed in violation of written instructions furnished by the manufacturer, repaired or altered, misused or damaged, or not properly maintained.

UNDER NO CIRCUMSTANCES WILL HERSEY BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE USE OF THE PRODUCT(S).

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### **3/4"-2" HERSEY MODEL FDC DOUBLE CHECK VALVE ASSEMBLY**

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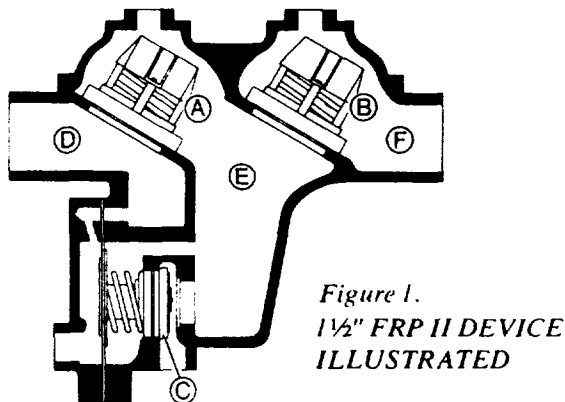
# 3/4"-2" BEECO MODEL FRP I / FRP II REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER

## Model FRP Section I — Description and Operation

### DESCRIPTION (see Fig. 1)

The BEECO Reduced Pressure Principle Backflow Preventer operates on the principle that water will not flow from a zone of lower pressure to one of higher pressure. It provides protection against backflow caused by both backpressure and backsiphonage.

The device consists of two spring-loaded check valves (A and B) and a spring-loaded, diaphragm-actuated differential pressure relief valve (C) located in the zone between the check valves.



### NORMAL OPERATION

The first check valve (A) causes all water passing through it to be automatically reduced in pressure by approximately 5-8 psi.

The second check valve (B) is lightly springloaded and forms the "double check" feature of the device. It acts to prevent unnecessary drainage of the domestic system in case a backflow condition occurs.

The relief valve (C) is spring-loaded to remain open, and diaphragm actuated to close by means of differential pressure.

To illustrate the operation, assume water, having a supply pressure of 60 psi, is flowing in a normal direction through the device. If all valves beyond area F are closed, creating a static condition, the water pressure in area D will be 60 psi and water pressure between the check valves (E) will be 52 psi.

The inlet pressure of 60 psi is transmitted through a drilled passageway to the underside of the diaphragm of the relief valve (C). This valve is springloaded to remain in an open position until the differential pressure amounts to approximately 4 psi across the relief valve.

During normal operation, therefore, the 8 psi dif-

ferential pressure produced by the first check valve (A) exceeds the spring-loading of the relief valve (C) and causes the relief valve (C) to remain closed.

### BACKFLOW

There are two conditions that tend to produce backflow:

**Backsiphonage** — where the pressure in the drinking water system becomes less than atmospheric due to a vacuum or partial vacuum in that system.

**Backpressure** — where the pressure in the nonpotable system exceeds that in the drinking water system.

### BACKSIPHONAGE

As the supply pressure drops in area D, it also drops in the area below the diaphragm of the relief valve (C). When the pressure differential across the diaphragm decreases to approximately 4 psi, the relief valve (C) will start to open. This happens because the spring above the diaphragm of the relief valve (C), which is trying to force the valve open, is designed to compress with a differential pressure of 8 psi. When that differential is decreased to 4 psi, the spring will extend and cause the relief valve (C) to start to open.

This spring-loaded relief valve is designed to eliminate intermittent discharges and "spitting" with normal minor fluctuations in the line pressure.

As the supply pressure continues to drop, the relief valve (C) automatically opens to drain and, regardless of the pressure on the supply side, approximately 4 psi less pressure will be maintained between the check valves (zone E) until zone pressure reaches atmospheric.

### BACKPRESSURE

Assume that pressure at the discharge side (F) increases to 80 psi, while the supply pressure (D) remains at 60 psi:

1. If the second check valve (B) does not leak, water under higher pressure in area F will not enter the area between the check valves (zone E), and the pressure in this zone will remain at 52 psi. Under these conditions, the relief valve (C) will remain closed since the 8 psi differential pressure is still being maintained between the supply pressure (area D) and the area of reduced pressure between the check valves (zone E).

2. If the second check valve (B) does leak, water under high pressure (area F) will flow into zone E. If the pressure in this zone increases to approximately 56 psi — still 4 psi lower than the supply pressure (area D) — the relief valve will start to open and discharge this reversely flowing water to atmosphere, maintaining the pressure in zone E approximately 4 psi lower than supply pressure. The relief valve will automatically continue to drain as long as this backflow condition exists and as long as the second check valve (B) is leaking.

If for any reason the first check valve (A) should leak during a shutoff beyond area F, the water under higher pressure in area D will leak into zone E. This will cause the relief valve to open as previously described and, again, provide visual indication at the drain outlet.

In the unlikely event that the relief valve diaphragm should rupture, an unbalanced condition between area D and zone E will occur, and the relief valve will immediately discharge to atmosphere.

## FRP SECTION II — INSTALLATION

### A. GENERAL INSTALLATION INSTRUCTIONS

1. Before installing the device, pipelines should be thoroughly flushed to remove foreign material.
2. If not already provided, shut off valves should be installed at each end of the device so that it can be tested and maintained. A  $\frac{1}{4}$ " test cock must be mounted on the inlet side of the inlet shutoff valve.
3. Devices must be installed in a *horizontal* position above the ground or floor level.
4. Devices should be installed in an accessible location with ample clearance to facilitate testing and repairs. (See Fig. 2)
5. In no case should the relief valve discharge be solidly piped into a sump, sewer, drain-age ditch, etc.
6. This device should be tested upon installation to insure proper operation and then inspected periodically for continual dis-

charge from the relief valve, which indicates a need for maintenance.

### B. WARM CLIMATE OUTDOOR INSTALLATION (See Fig. 2)

1. Reduced pressure backflow preventers should be installed only where there is adequate drainage and no danger of freezing. At no time should they be placed where any part of the unit could be submerged in standing water. The recommended installation is above ground. A concrete slab under the unit is sometimes desirable.
2. Normally, any discharge from the relief valve is spilled onto the ground. Drainage may be piped away from the location, in which case, an air gap must be used between the relief valve port and the drain line. (See Fig. 4)

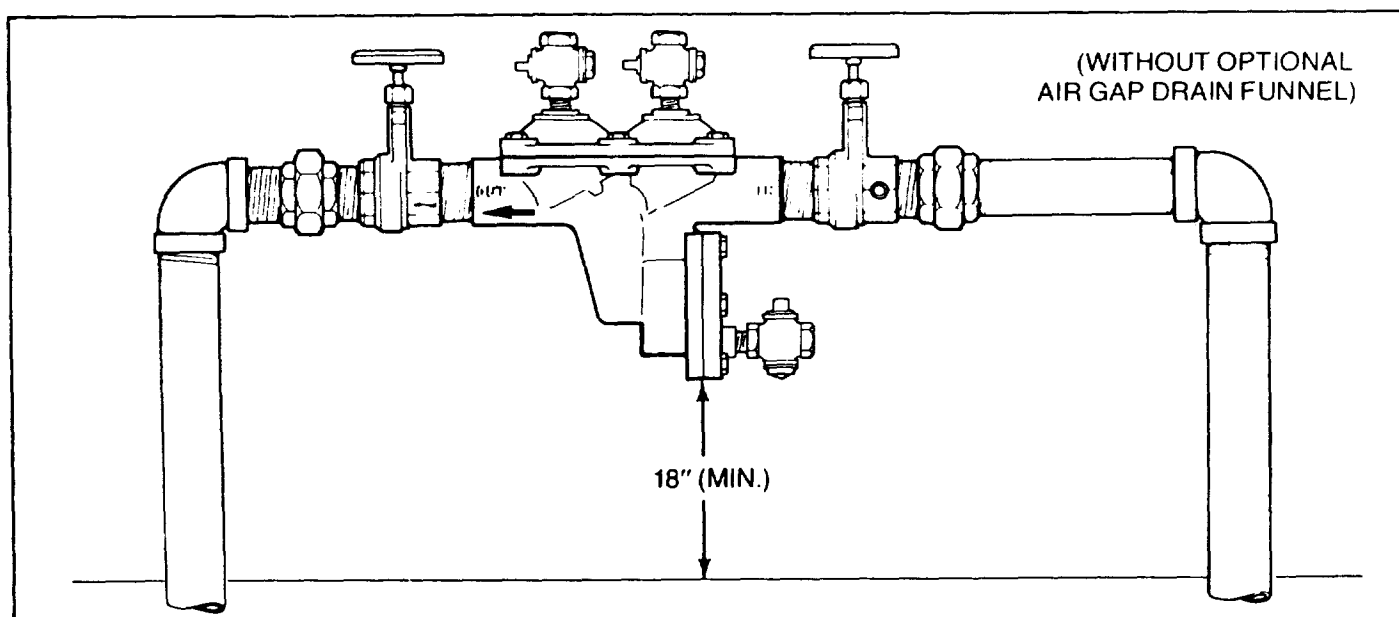


Figure 2. WARM CLIMATE OUTDOOR INSTALLATION

### C. COLD CLIMATE OUTDOOR INSTALLATION

In remote locations or where installation cannot be made in a heated building, a separate insulated structure should be built around the backflow preventer and adjacent piping. In extremely cold areas, some form of heat should be provided within the structure. Strip heaters or light bulbs may be sufficient for this purpose.

### D. COLD CLIMATE INDOOR INSTALLATION (See Fig. 3)

In climates where freezing conditions are likely, or where it is impractical to install the backflow preventer above ground, the installation should be made at an easily accessible location inside a heated building.

The unit should be placed above the floor at a distance great enough to allow clearance for repair work. If the backflow preventer is positioned against a wall, care should be taken to be sure that the four test cocks are easily accessible. Proper drainage should be provided for the relief valve. An air gap must be used between the relief valve outlet and the drain line if drainage is to be piped away.

### E. MODIFIED PIT INSTALLATION (See Fig. 5)

In the event installation must be made in a pit, only the modified pit type installation may be used. The relief valve drain should be piped to the outside of the pit and discharged no less than 12" above the grade line.

### F. BATTERY (PARALLEL) INSTALLATION (See Fig. 6)

Where it is essential to provide uninterrupted water service, installation of two model FRP devices in a battery (parallel) setting is recom-

mended. This avoids interruptions to water service when maintenance or testing is required. One device can be shut off while the other is left in operation. This installation also provides higher flow capacity than provided by one backflow preventer.

### G. CORRECTION OF DISCHARGE

1. After installation, *with flow through the device*, continual discharge from the relief valve opening usually indicates that there is foreign material holding the relief valve open. To remove foreign material, flush relief valve as follows:

- Close inlet shutoff valve.
- Open test cock No. 2. Relief valve should fully open and discharge.
- Close test cock No. 2.
- Open inlet shutoff valve.

If relief valve continues to leak, repeat procedure. If flushing does not stop discharge, with flow through the device, close shutoff valves, remove and clean the relief valve.\*

2. After installation, *with no flow through the device* (inlet shutoff valve open, outlet shutoff valve closed) continual discharge from the relief valve indicates a leaking first check valve, probably caused by foreign material under the seat. If flushing (substantial flow through the device) will not clear the device, close shutoff valves, remove and clean the first check valve.\*

3. Occasional "spitting" or momentary discharge from the relief valve can be expected, if line pressure drops suddenly, due to operation of flushometers, quick opening valves, or similar devices and valves.

\*See Disassembly and Cleaning Procedures.

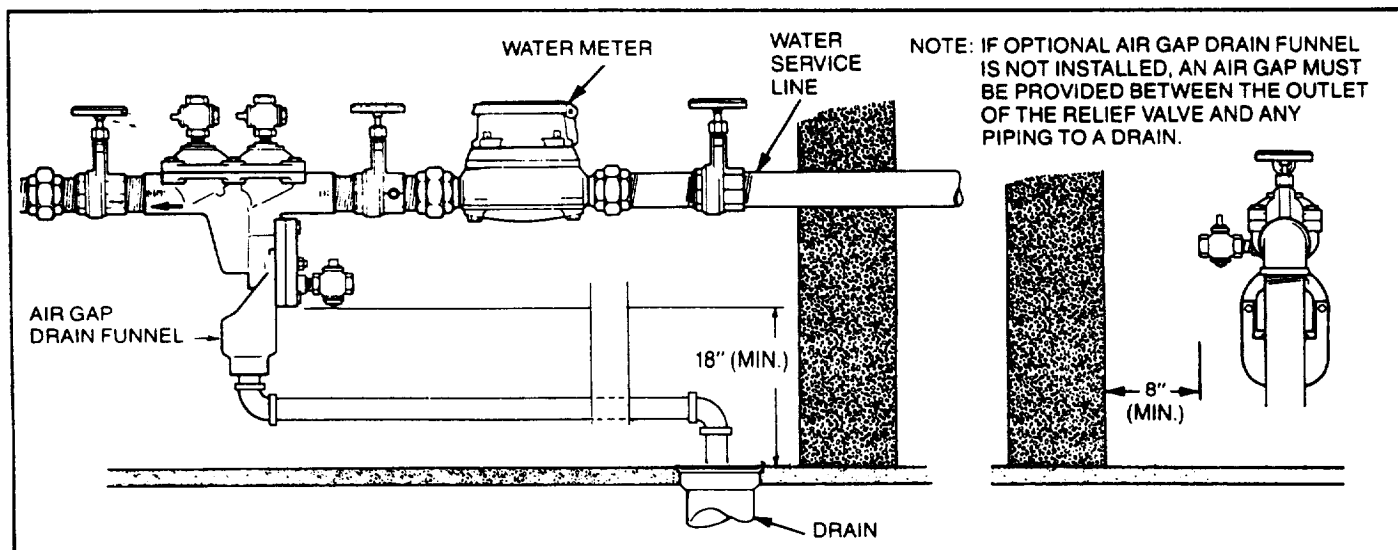


Figure 3. COLD WEATHER INDOOR INSTALLATION

## MODEL FRP RELIEF VALVE AIR GAP DRAIN FITTING

### GENERAL

This fitting has been designed to permit direct connection of the relief valve drain piping to the backflow preventer. It provides an air gap below the outlet of the relief valve; and includes an internally-threaded opening at its base.

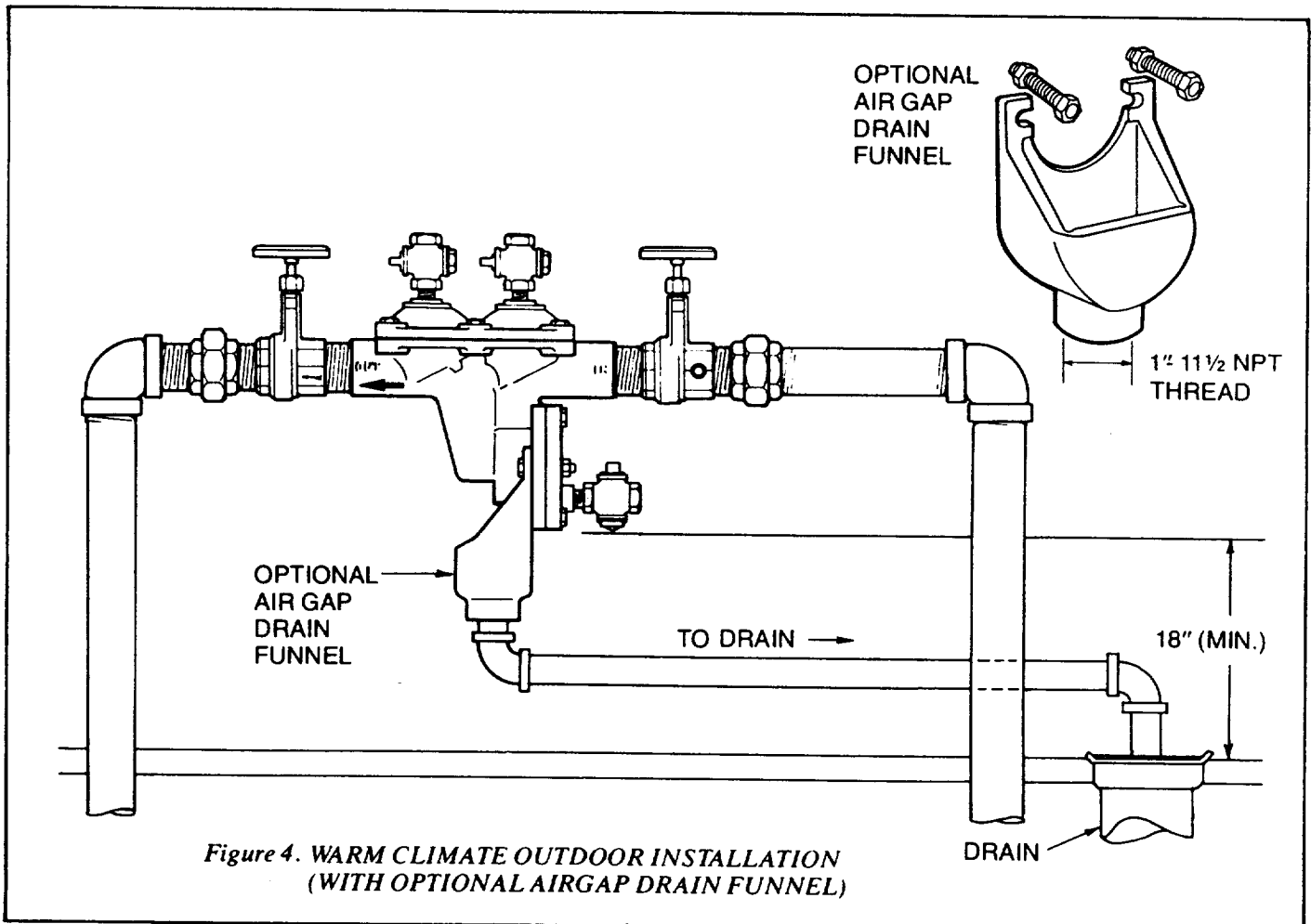
Two sizes are provided: one for installation on  $\frac{3}{4}$ " and 1" devices; and the second for installation on  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ " and 2" devices. The internal thread size is 1" -  $11\frac{1}{2}$  NPT on both fittings. Both fittings are available as kits which include the fitting and two connection bolts and nuts (see FRP Parts List, pages 10 and 12).

### INSTALLATION (see Fig. 3)

Remove the two relief valve cover bolts that are in line with the notches on the fitting. Discard them.

Hold the fitting in position against the flange on the bottom case *opposite* the cover. Insert bolts into the holes on the flange and tighten firmly, using an open-end wrench. Install nuts.

Thread piping to fitting, using commercially-available pipe sealant.



## FRP SECTION III — MAINTENANCE

### A. DISASSEMBLY

1. Remove top case bolts and lift off top case(s).
2. Loosen check valve mounting screws and lift off check valve assemblies, with screws attached. (See Fig. 7, 14A, 14B, 15).
3. Remove relief valve housing bolts and relief valve housing, or relief valve cover (See Fig. 7, 14A, 14B, 15).
4. Remove relief valve assembly from housing by grasping diaphragm and lifting assembly up (FRPI) or pull out horizontally (FRPII).
5. Inspect relief valve seat for damage caused by foreign material. If it requires replacement, order repair kit (see page 10, 12).
6. To remove seat, insert wrench and turn counterclockwise. (See Fig. 9A, 9B).

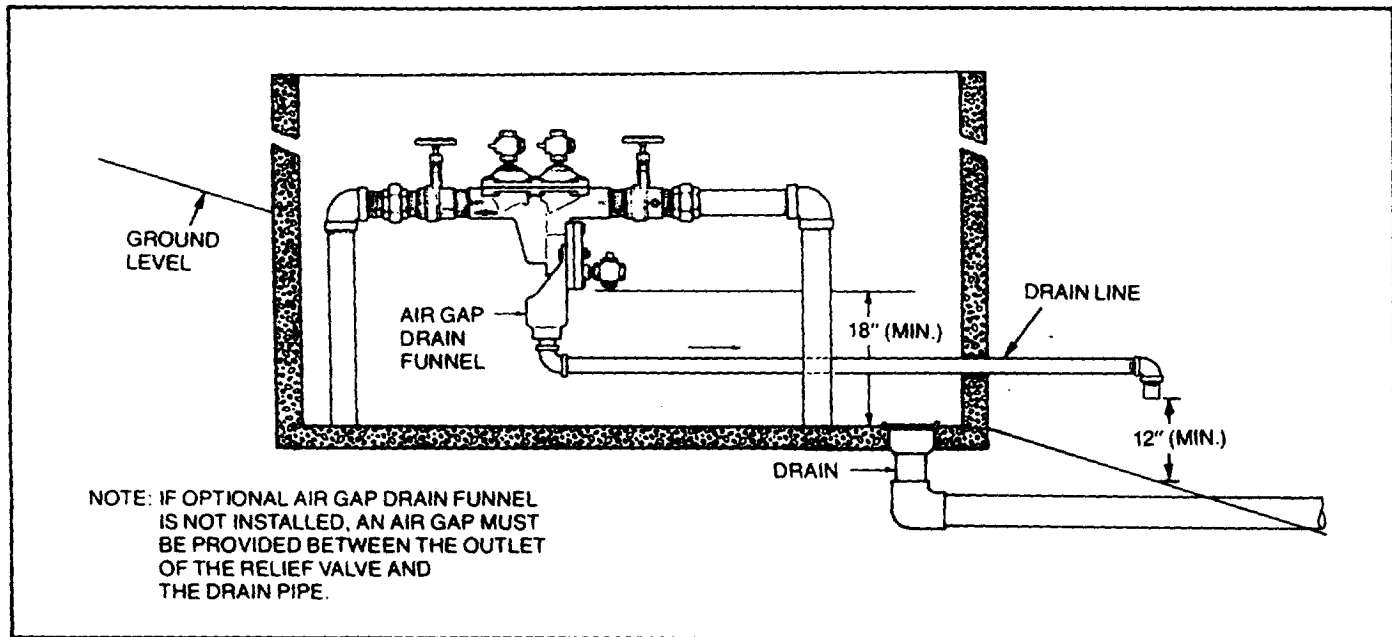


Figure 5. MODIFIED PIT INSTALLATION

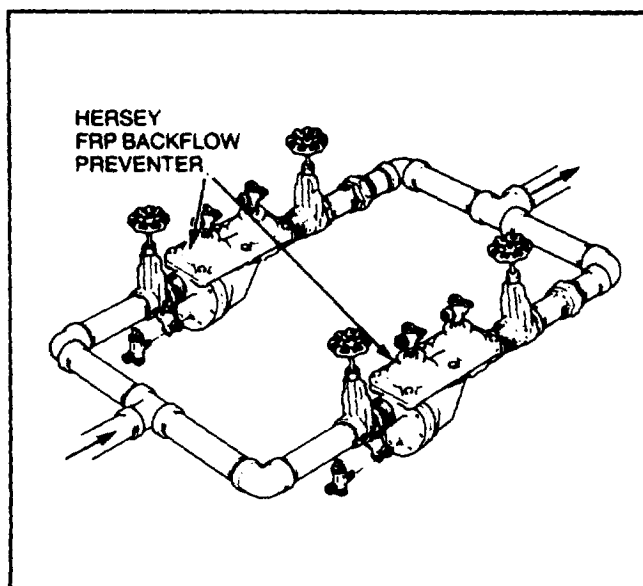


Figure 6. BATTERY (PARALLEL) INSTALLATION

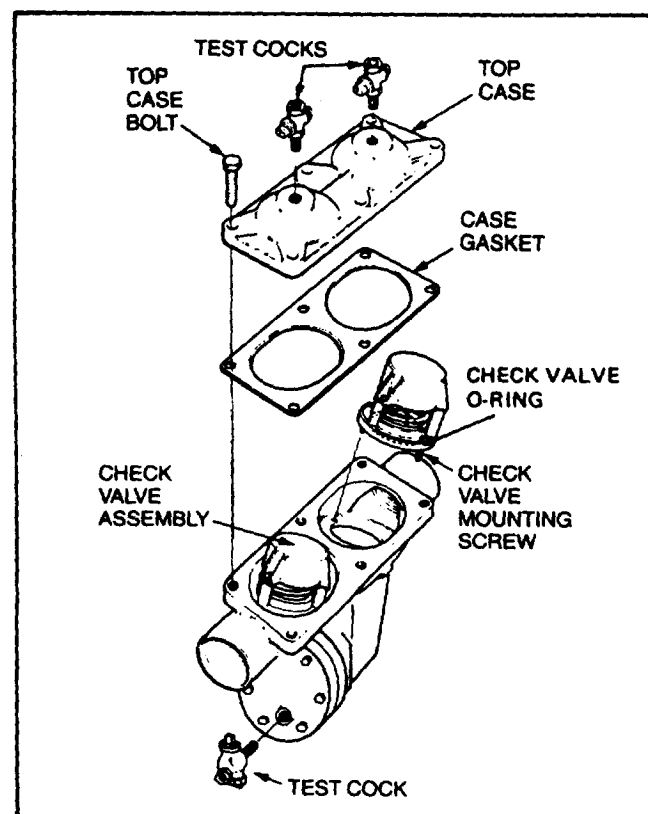


Figure 7. 3/4" AND 1" CHECK VALVE ASSEMBLIES

## B. CLEANING

### 1. Check Valves

- If dirt in the lines has accumulated on first check valve seat, causing leakage when there is no flow through the device, remove check valve as outlined in Paragraph A.
- Open  $\frac{3}{4}$ " and 1" first check valves as follows:
  - Press thumb against disc to compress spring.
  - Insert flat-sided wooden pencil between seat and disc to hold valve open (see Fig. 10).
- Open  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ " and 2" first check valves as follows:
  - Remove the check valve disc screw, but leave washer in place.
  - Attach the spring compression tool (see Fig. 11) with 4 machine screws

and wing nuts provided, using the mounting screw holes in the check valve seat ring.

- Engage the pilot on the end of the jacking screw in the valve screw hole.
- Turn jacking screw clockwise to open valve.
- To open second check valves, all sizes, press thumb against disc to compress spring.
- Clean valve seats and discs with a clean non-abrasive cloth. **DO NOT USE SOLVENTS ON THE PLASTIC SEAT!**
- Re-assemble check valves to body of device. (On  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ " and 2" sizes first remove spring compression tool and replace disc screw.)
- If cleaning does not stop leaking replace the check valve assembly.

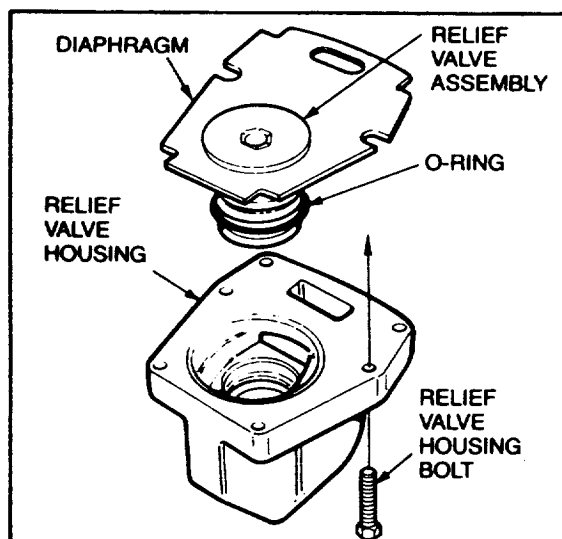


Figure 8A. RELIEF VALVE ASSEMBLY FRP-I

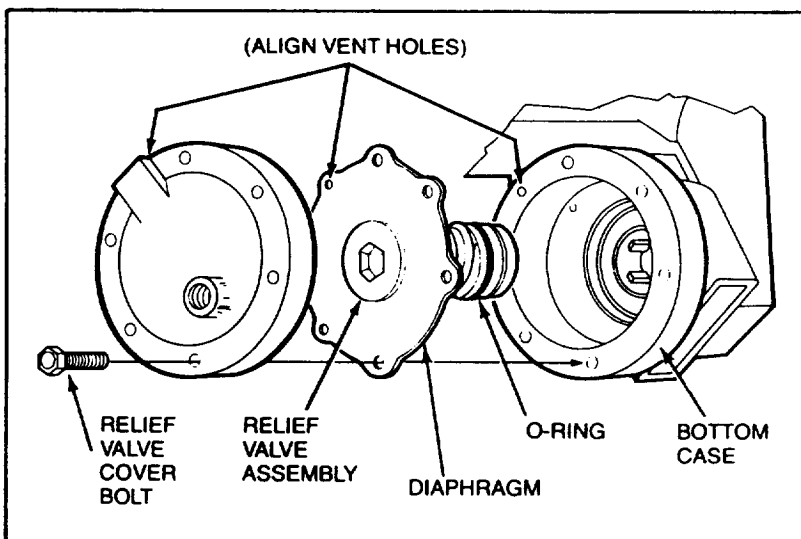


Figure 8B. RELIEF VALVE ASSEMBLY FRP-II  
(1-1/2" ILLUSTRATED)

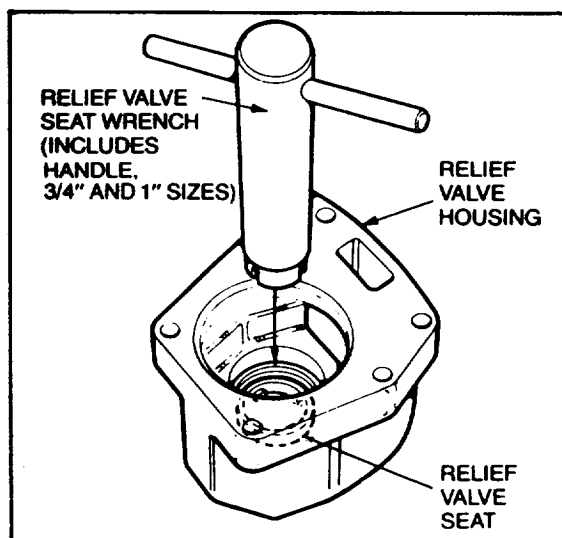


Figure 9A. RELIEF VALVE SEAT  
REPLACEMENT FRP-I

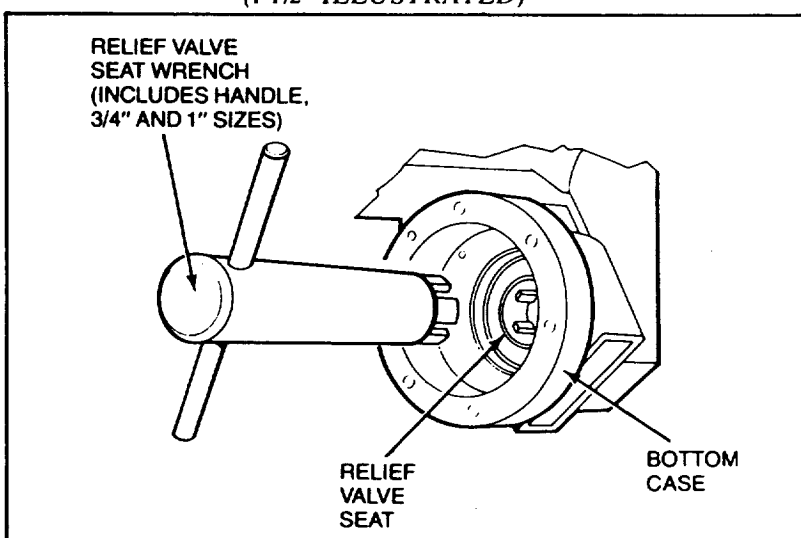


Figure 9B. RELIEF VALVE SEAT REPLACEMENT FRP-II

## C. REPAIRS

Foreign matter in the supply line may cause wear or damage to components of the check and relief valve assemblies. To simplify repair procedures, complete valve assemblies, rather than individual parts, are provided at modest prices.

Kits are available for the first check, second check and relief valve assemblies, and also including all three valves. Case gaskets, o-ring seals and mounting screws (first and second valve kits) are included. See description on pages 10 and 12.

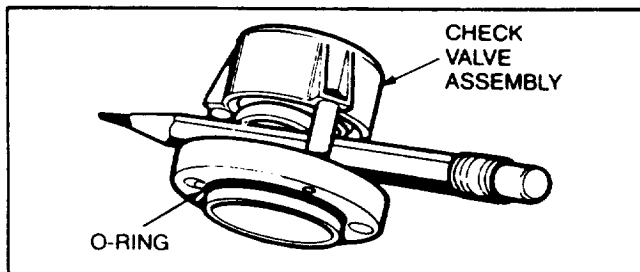


Figure 10. CLEANING 3/4" AND 1" CHECK VALVE

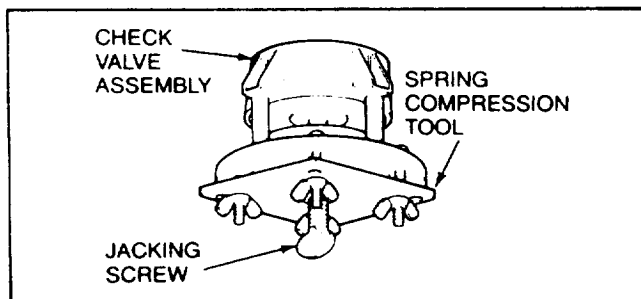


Figure 11. CLEANING 1 1/4", 1 1/2" AND 2" CHECK VALVE

## D. REASSEMBLY

### 1. Check valves

- Make sure o-ring is in place as shown in Figure 7.
- Place mounting screws in holes in check valve assembly as shown in Fig. 7, and position valve in body. The 3/4" and 1" valves have 2" screws; the 1 1/4", 1 1/2" and 2" valves have 4 screws.
- Tighten screws until resistance is felt. Do not overtighten screws.

### 2. Relief Valve

- Make sure o-ring is in place as shown in Fig. 8.
- If seat has been removed, apply Loctite adhesive sealant to threads of replacement seat (remove any residue from bottom case or housing threads before installing seat.)
- Install seat, using special wrench. Turn clockwise until resistance is felt. To avoid distortion of seat do not overtighten.

NOTE: Do not get any sealant on seating area of seat. Remove any present before installing relief valve assembly.

- Push relieve valve into position in housing or bottom case, seating o-ring in recess.
- Align diaphragm plate parallel to flange on housing or bottom case. Diaphragm holes must align with holes in flange. (See Figs. 8A and 8B.) On 1 1/4", 1 1/2" and 2" sizes, the diaphragm plate extends inside the outer surface of the flange.
- Test relief valve operation by pushing assembly in with thumbs to compress spring. Assembly should spring back when pressure is released.
- Reassemble housing or cover to bottom case.

NOTE: On the FRPII, the vent holes in the cover, diaphragm and flange must be aligned. The vent hole in the cover is inside the boss opposite the test cock.

NOTE: Tighten all bolts finger-tight before using wrench. Tighten opposite bolts in sequence to avoid cocking the assembly.

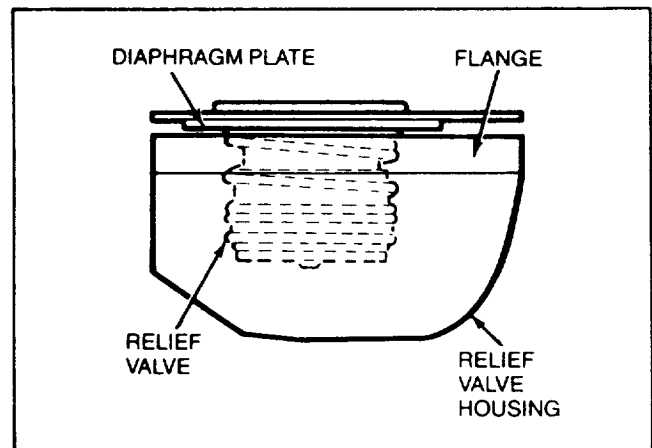


Figure 12A. REPLACING RELIEF VALVE FRP-I

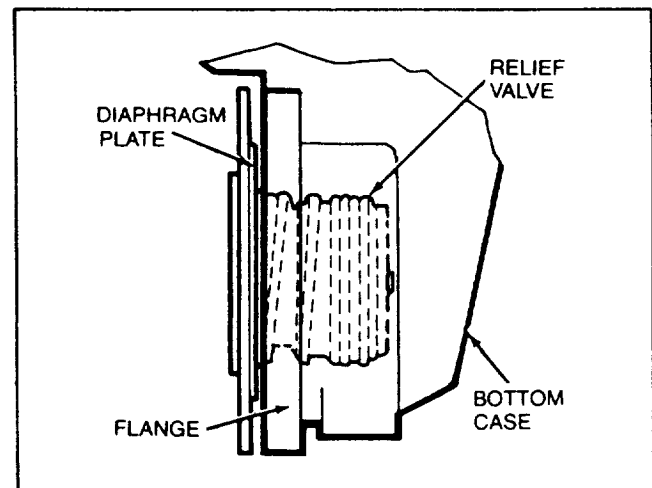


Figure 12B. REPLACING RELIEF VALVE FRP-II

# DIFFERENTIAL PRESSURE GAUGE TEST METHOD

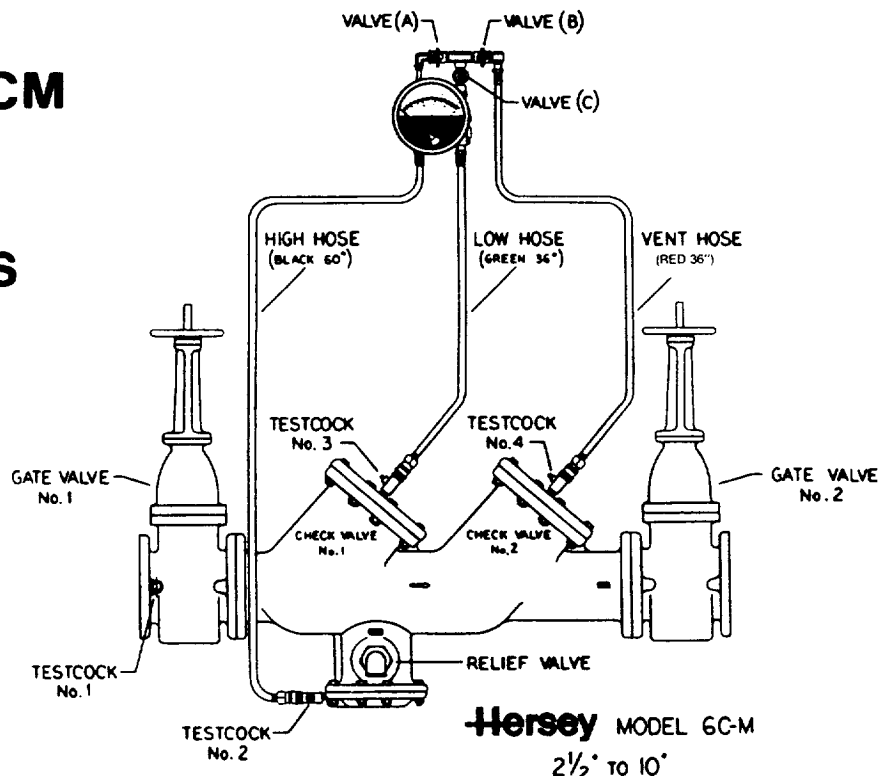
## BEECO TEST KIT PART NUMBER 98415

### MODEL FRP II and 6CM

## REDUCED PRESSURE BACKFLOW PREVENTERS

### ASSEMBLY OF TEST KIT TO BACKFLOW PREVENTER

1. Close valves (A), (B) and (C) on test kit.
2. Connect HIGH pressure hose (black) to testcock No. 2 on the device.
3. Connect LOW pressure hose (green) to testcock No. 3.
4. Close gate valve No. 2.
5. Open testcocks No. 2 and No. 3.
6. Open vent valve (B).
7. Open high pressure (A) and low pressure (C) valves until all air is expelled.
8. Close (A), (B) and (C) valves.
9. Connect VENT hose (red) to testcock No. 4 on the device.



### TEST PROCEDURES

- A. To determine the static pressure drop across the first check valve. Requirement: the first check valve shall maintain a static pressure drop of at least 5 PSI.
1. Testcocks No. 2 and No. 3 must be open.
  2. Crack open gate valve No. 2 to re-establish pressure conditions in the device.
  3. Close gate valve No. 2 and note the differential pressure on the gauge. A reading of 5-8 PSI is normal.

- B. To test the second check valve for tightness against reverse flow. Requirement: the second check valve must be tight against reverse flows under all pressure differentials.

1. Slowly open HIGH valve (A) and VENT valve (B). Keep LOW valve (C) closed.
2. Open testcock No. 4
3. The differential pressure reading on the gauge will drop slightly and then remain steady. If the gauge reading continues to drop (until the relief valve discharges), it indicates that the second check valve is leaking.

- C. To test gate valve No. 2 for tightness. After passing Test B, continue the test by closing testcock No. 2. The indicated pressure will decrease slightly. If the pressure differential continues to decrease (approaching zero), the No. 2 gate valve is reported to be leaking.

NOTE: If gate valve No. 2 is leaking, the Test A is invalid. An indication of leakage in Test B could be either check valve No. 1 or check valve No. 2. If no indication of leakage in Test B, then both check valves are tight.

- D. To test operation of the differential pressure relief valve. Requirement: the differential pressure relief valve must operate to maintain the zone between the two check valves at least 2 PSI less than the supply pressure.
1. Valves (A), (B) and (C), and testcock No. 4 must be closed. Testcocks No. 2 and No. 3 must be open.
  2. Open HIGH valve (A).
  3. Very slowly open LOW valve (C) until the differential gauge needle starts to drop. Note the pressure reading when the relief valve starts to discharge. This gauge reading must be at least 2 PSI.

NOTE: If during test C, gate valve No. 2 is shown to be leaking, also open VENT valve (B) and testcock No. 4 during step #2 of Test D. This extra step uses supply pressure to seat check valve No. 2 and allows testing of the relief valve.

### TEST CONCLUSION

1. Close all testcocks.
2. Disconnect VENT hose from testcock No. 4
3. Open valves (A), (B) and (C) to drain water pressure from the test gauge.
4. Remove hoses from testcocks No. 2 and No. 3 and drain remaining water in the gauge to prevent freezing.



# FRP SECTION V — ¾" AND 1" REPLACEMENT PARTS (SEE FIGS. 14A AND 14B)

	Part No. ¾"-1"	
— COMPLETE VALVE KIT — FRP I FRP II	65554 65627	RELIEF VALVE AIR GAP FITTING KIT 65639
Includes:		
First Check Valve Assembly		RELIEF VALVE SEAT 65524
Second Check Valve Assembly		INSTALLATION KIT
Relief Valve Assembly		Includes:
Case Gasket		Relief Valve Seat
Check Valve O-rings (2)		Relief Valve Seat Wrench
Relieve Valve O-ring		Relieve Valve Adhesive/Sealant
Check Valve Mounting Screws (4)		
FIRST CHECK VALVE KIT 65555		DIFFERENTIAL PRESSURE GAUGE TEST KIT 98415
Includes:		
First Check Valve Assembly		OTHER PARTS:
Check Valve O-ring		Relief valve cover-FRP II 65624
Case Gasket		Relief valve housing w/seat
Mounting Screws (2)		Ring-FRP I N/A
SECOND CHECK VALVE KIT 65556		Top case 65531
Includes:		Bottom case-FRP II ¾" 65623
Second Check Valve Assembly		Bottom case-FRP II 1" 65622
Check Valve o-ring		Bottom case-FRP I N/A
Case Gasket		Case bolts -FRP I 90026 (12)
Mounting Screws (2)		Case bolts-FRP II 90026 (12)
RELIEF VALVE KIT — FRP I 65557		Test cocks 96339 (3)
FRP II 65628		Check valve mounting screws 98116 (4)
Includes:		Case gasket 65534
Relief Valve		(Figures in parentheses after part number indicate number of parts required, if more than one.)
O-ring Seal		

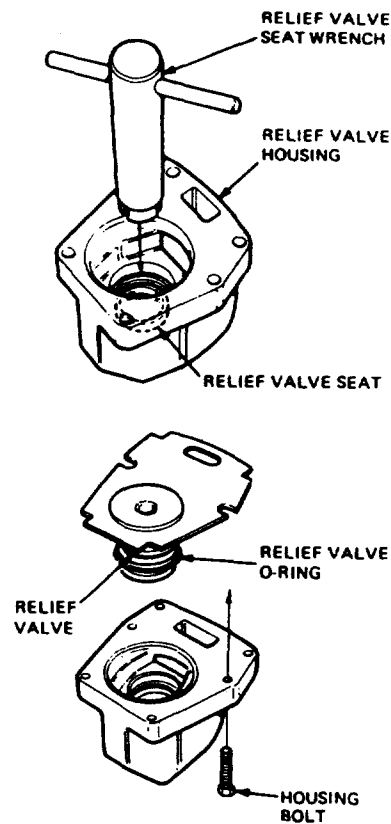
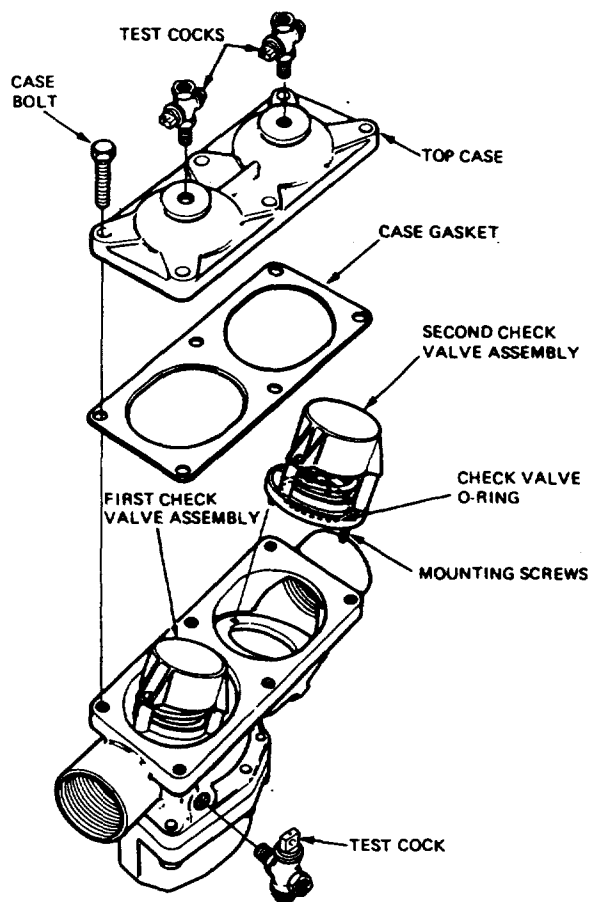


Figure 14A. 3/4"-1" FRP-I REPLACEMENT PARTS

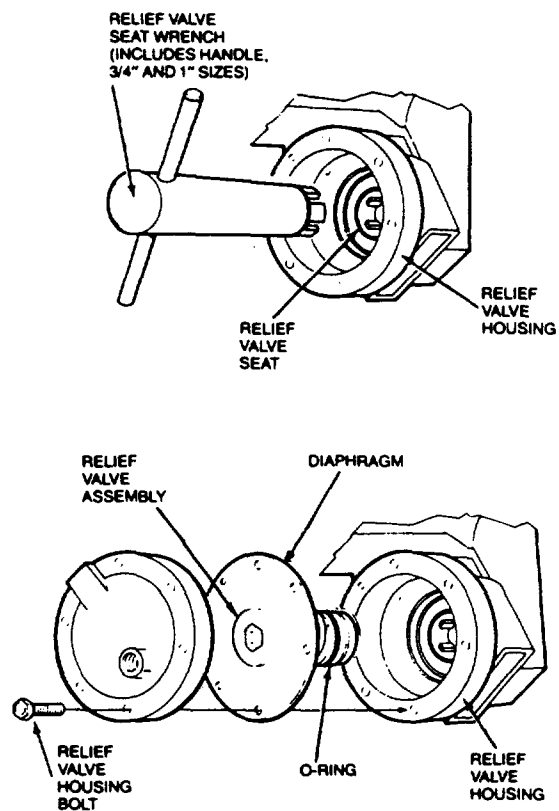
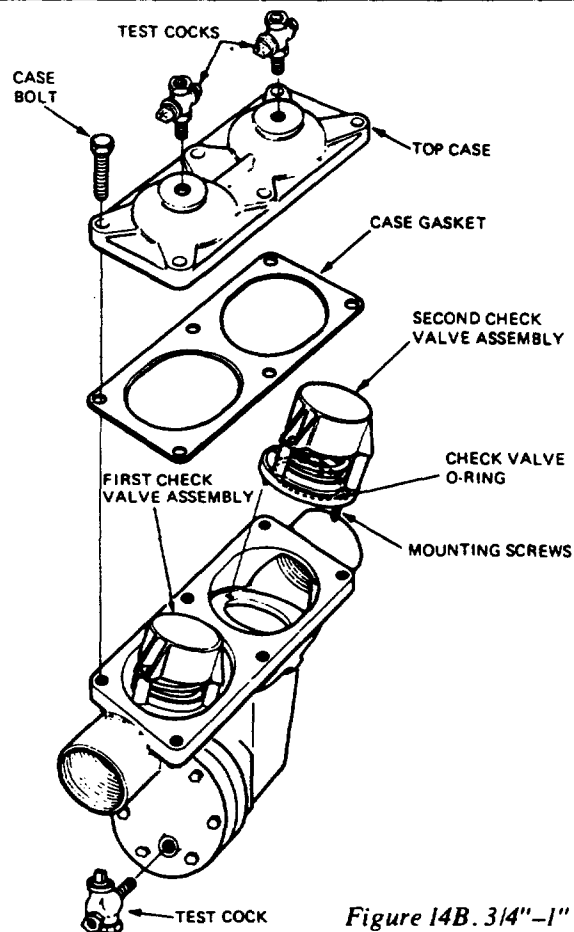


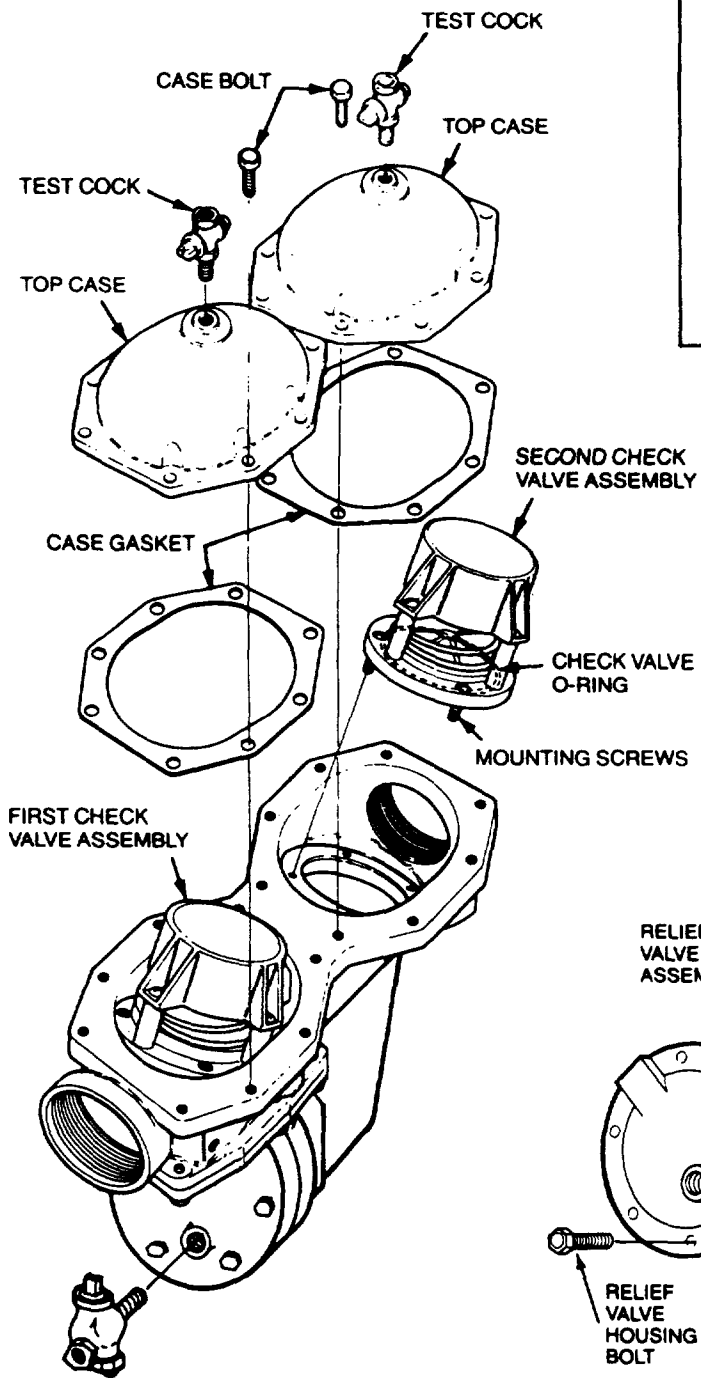
Figure 14B. 3/4"-1" FRP-II REPLACEMENT PARTS

# FRP SECTION VI-1¼", 1½" and 2" FRP-II REPLACEMENT PARTS (SEE FIG. 15)

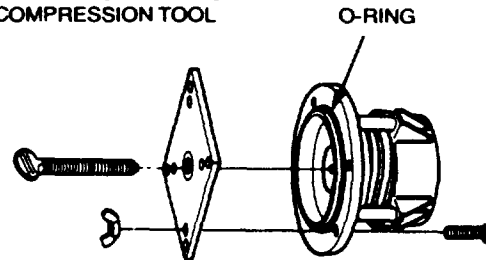
If more than one part per unit is required, quantity is indicated in parentheses after part number.

	Part No. 1¼", 1½"	Part No. 2"
<b>COMPLETE VALVE KIT</b>		
Includes:	65525	65543
First Check Valve Assembly		
Second Check Valve Assembly		
Relief Valve Assembly		
Case Gaskets (2)		
Check Valve O-rings (2)		
Relief Valve O-ring		
Check Valve Mounting Screws (8)		
<b>FIRST CHECK VALVE KIT</b>	65526	65544
Includes:		
First Check Valve Assembly		
Check Valve O-ring		
Case Gasket		
Mounting Screws (4)		
<b>SECOND CHECK VALVE KIT</b>	65527	65545
Includes:		
Second Check Valve Assembly		
Check Valve O-ring		
Case Gasket		
Mounting Screws (4)		
<b>RELIEF VALVE KIT</b>	65546	65546
Includes:		
Relief Valve		
O-Ring Seal		
<b>RELIEF VALVE SEAT INSTALLATION KIT</b>	65548	65548
Includes:		
Relief Valve Seat		
Relief Valve Seat Wrench		
Relief Valve Adhesive/Sealant		
<b>DIFFERENTIAL PRESSURE GAUGE TEST KIT</b>	98415	98415
<b>RELIEF VALVE AIR GAP FITTING KIT</b>	65640	65640

	Part No. 1¼", 1½"	Part No. 2"
<b>OTHER PARTS</b>		
Relief Valve Cover .....	65632	65632
Top Case .....	65560(2)	65578(2)
Bottom Case .....	65631	65636
Case Bolts .....	90028(18)	90028(22)
Test Cocks .....	96339(3)	96339(3)
Check Valve Spring Compression Tool .....	65572	65572
Check Valve Mounting Screws .....	98174(8)	98174(8)
1½" x 1¼" Reducing Bushing (1¼" only) .....	67016(2)	-----
Case Gasket .....	65568(2)	65595(2)



#### CHECK VALVE SPRING COMPRESSION TOOL



#### RELIEF VALVE SEAT WRENCH (INCLUDES HANDLE, 3/4" AND 1" SIZES)

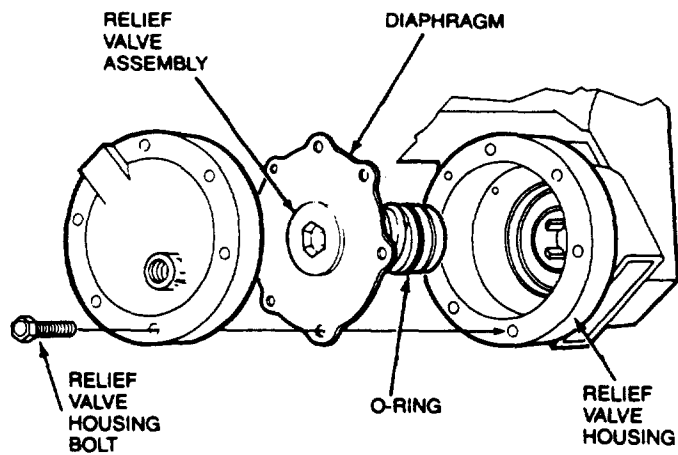
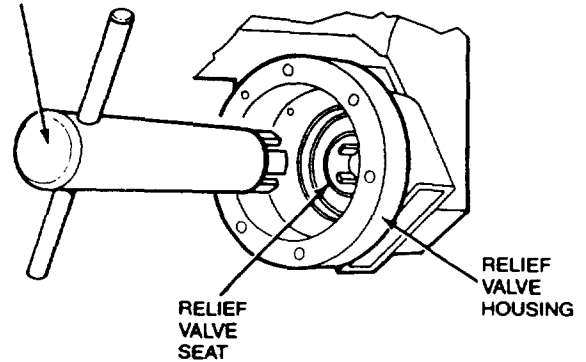


Figure 15. 1/4", 1/2" AND 2" FRP II REPLACEMENT PARTS

# FDC-SECTION I — Description, Operation and Installation-Model FDC Double Check Valve Assemblies

## DESCRIPTION AND OPERATION

The Hersey Model FDC Double Check Valve Assembly consists of two independent spring-loaded poppet-type check valve assemblies, mounted in series in a common body. Two gate valves and four test cocks for field testing complete the assembly. For ease of repair, the valve assemblies are removable from the top of the device, making possible in-line maintenance without removing the device from its setting.

Under normal operating conditions, the check valves remain closed until there is a demand for water. Each of the two check valves is designed to open at a one psi pressure differential in the direction of flow. In the event pressure increases downstream of the device, tending to reverse the direction of flow, both check valves are closed to

prevent backflow. If the second check valve is prevented from closing tightly, the first check valve will still provide protection from a backflow condition.

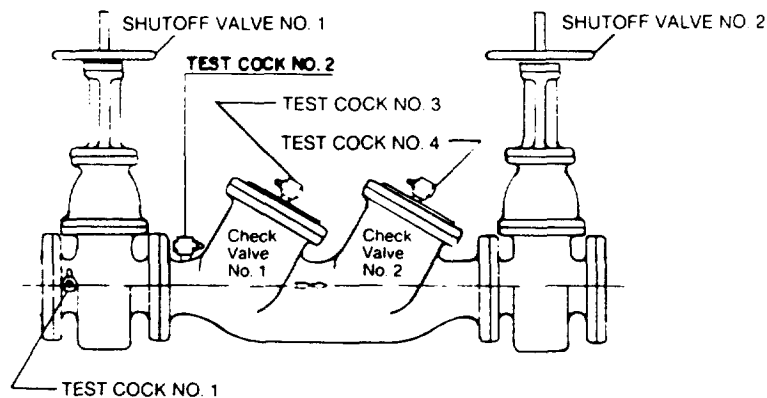
## INSTALLATION

The same instructions apply to installation of the Model FDC as for the Model FRP, except that no provision for discharge of water from the device has to be made. In addition to being installed in the horizontal position, the Model FDC may also be installed in the vertical position when the flow is upward. See pages 3-5.

## MAINTENANCE

The Model FDC should be tested annually, and valves replaced at least every 5 years. For further details, refer to cleaning, repair and assembly procedures for Model FRP check valves, pages 6-8.

## FDC SECTION II TESTS



## TEST PROCEDURE - Using Beeco Differential Pressure Test Kit Part Number 98415 Double Check Valves - Hersey Model No. 2 and FDC\*

### TESTING OF CHECK VALVE NO. 1

1. Close No. 1 and No. 2 gate valves.
2. Open testcocks Nos. 2, 3 and 4. Confirm that gate valve No. 1 is holding tight by observing that the discharge of water from testcock No. 2 stops.
3. Attach test kit VENT hose (red) to testcock No. 1, LOW hose (green) to testcock No. 2, and HIGH hose (black) to testcock No. 3. Open valves (A) and (B). Close valve (C).
4. Close testcock No. 4.
5. Open testcock No. 1. The needle on the gauge will indicate a pressure in excess of 15 PSI.
6. Slowly open valve (C) until the gauge reads approximately 10 PSI. Close valve (C). The gauge reading will not change if check valve No. 1 is holding tight. If No. 1 check valve is leaking the gauge reading, will drop to 0.

### TESTING OF CHECK VALVE NO. 2

1. Close testcock No. 1.
2. Open testcock No. 4.
3. Change LOW hose from testcock No. 2 to testcock No. 3. Change HIGH hose from testcock No. 3 to testcock No. 4. Open valves (A) and (B). Close valve (C).
4. Open testcock No. 1. The needle on the gauge will indicate a pressure in excess of 15 PSI.
5. Slowly open valve (C) until the gauge reads approximately 10 PSI. Close valve (C). The gauge reading will not change if check valve No. 2 is holding tight. If check valve No. 2 is leaking, the gauge will drop to 0.

NOTE: Minor leakage in gate valve No. 2 will not affect the test results of check valve No. 2. However, a leaking gate valve No. 1 will cause a good check valve No. 1 to fail the test.

\*The same test method is used for testing the Hersey/BEECO Model HDC.

**TEST PROCEDURES — HERSEY NO. 2  
DOUBLE CHECK VALVE ASSEMBLY  
ALTERNATIVE TWO-GAUGE METHOD**

(SEE FIGURE 16)

QTY.	DESCRIPTION
------	-------------

- |     |  |
|-----|--|
| 2 - | Pressure gauges, of good quality - 2" dial or larger, 0-150 psi range.                                 |
| 3 - | 6-ft. lengths rubber hose with 1/4" watertight screw couplings. (1/4" i.d. welding hose is suggested). |
| 2 - | 1/4" level handle brass gauge cocks, double female.  |
| 2 - | 1/4" standard brass tees   |
| 2 - | 1/4" brass close nipples   |
| 6 - | 1/4" I.P. thread to welding hose thread brass couplings (sometimes called regulator outfit fittings).  |
|     | 3/8" plywood board for mounting gauges.  |

**TEST NO. 1**

**Purpose:**

To test No. 1 check valve for tightness against reverse flow.

**Requirement:**

Valve must be tight against reverse flow under all pressure differentials.

**Steps:**

1. Close shutoff valve No. 2.
2. Install pressure gauges and control cocks (closed) at test cocks No. 2 and No. 3.
3. Open test cocks No. 2 and 3. Close No. 1 shutoff valve.
4. Drain *slowly* from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. Close control cock. If both gauges hold the established differential pressure for at least one minute, the check shall be noted in the report as "Closed Tight".

If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 2 in the attempt to establish the one-pound differential. Confirm by the following procedure:

- a. Open shutoff valve No. 1 and re-establish pressure in the device.
- b. Install bypass hose between No. 1 and No. 3 test cocks, thus feeding line pressure downstream of check valve.
- c. Close shutoff valve No. 1. Drain slowly from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. If water runs continuously from control cock, the check shall be noted as "Leaked".

**TEST NO. 2**

**Purpose:**

To test No. 2 check valve for tightness against reverse flow.

**Requirement:**

Valve must be tight against reverse flow under all pressure differentials.

**Steps:**

1. Open No. 1 shutoff valve and re-establish pressure in the device.
2. Install pressure gauges and control cocks at test cocks No. 3 and No. 4.
3. Open test cocks No. 3 and No. 4. Close No. 1 shutoff valve.
4. Drain *slowly* from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. Close control cock. If both gauges hold the established differential for at least one minute, the check shall be noted as "Closed Tight." If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 3 in the attempt to establish the one-pound differential. Confirm by the following procedure:
  - a. Open No. 1 shutoff valve and re-establish pressure in the device.
  - b. Install bypass hose between No. 1 and No. 4 test cocks, thus feeding line pressure downstream of check valve.
  - c. Close No. 1 shutoff valve. Drain slowly from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. If water runs continuously from control cock, the check shall be noted as "Leaked".
  - d. Remove all equipment and return shut-off valves to original setting.

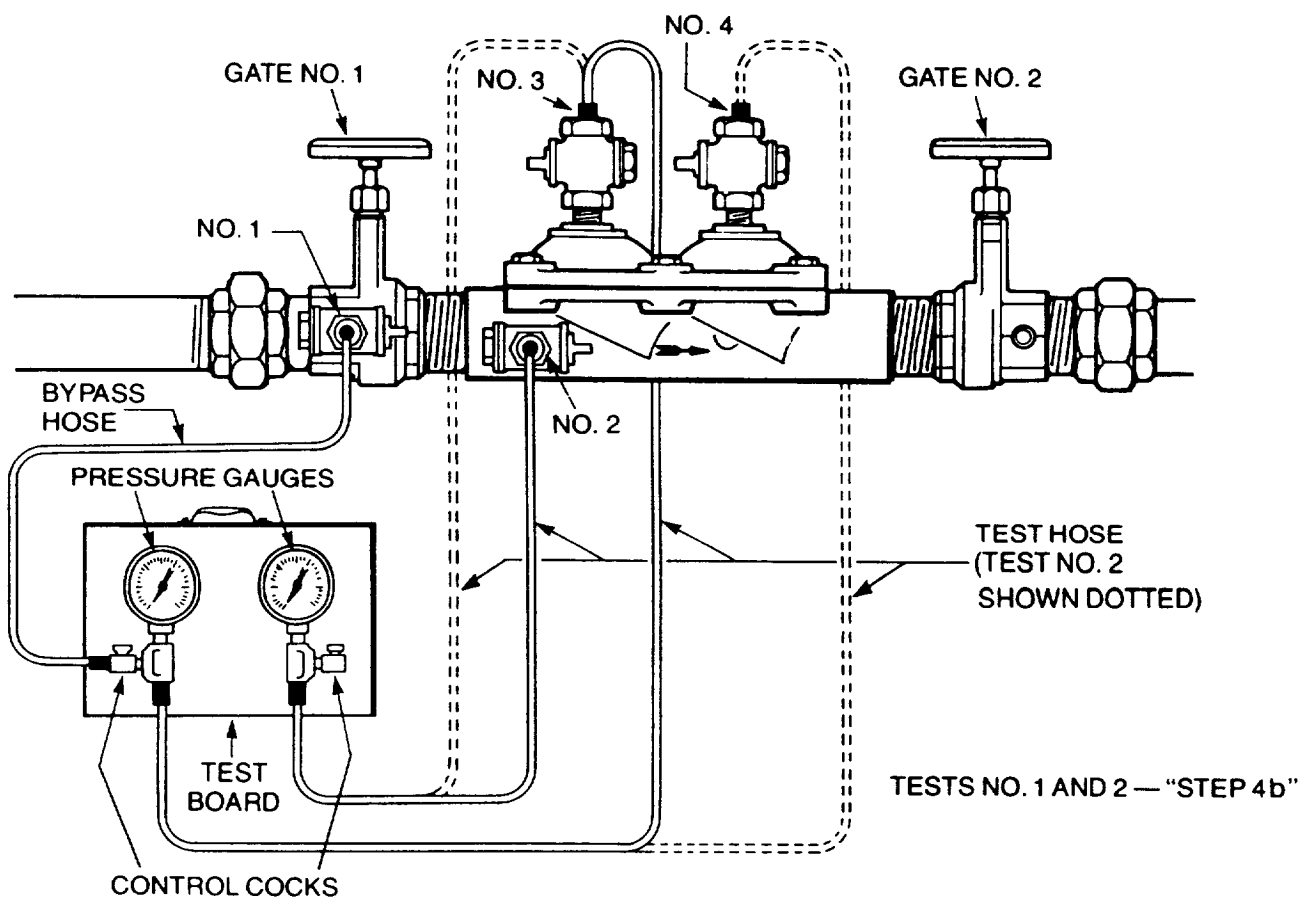
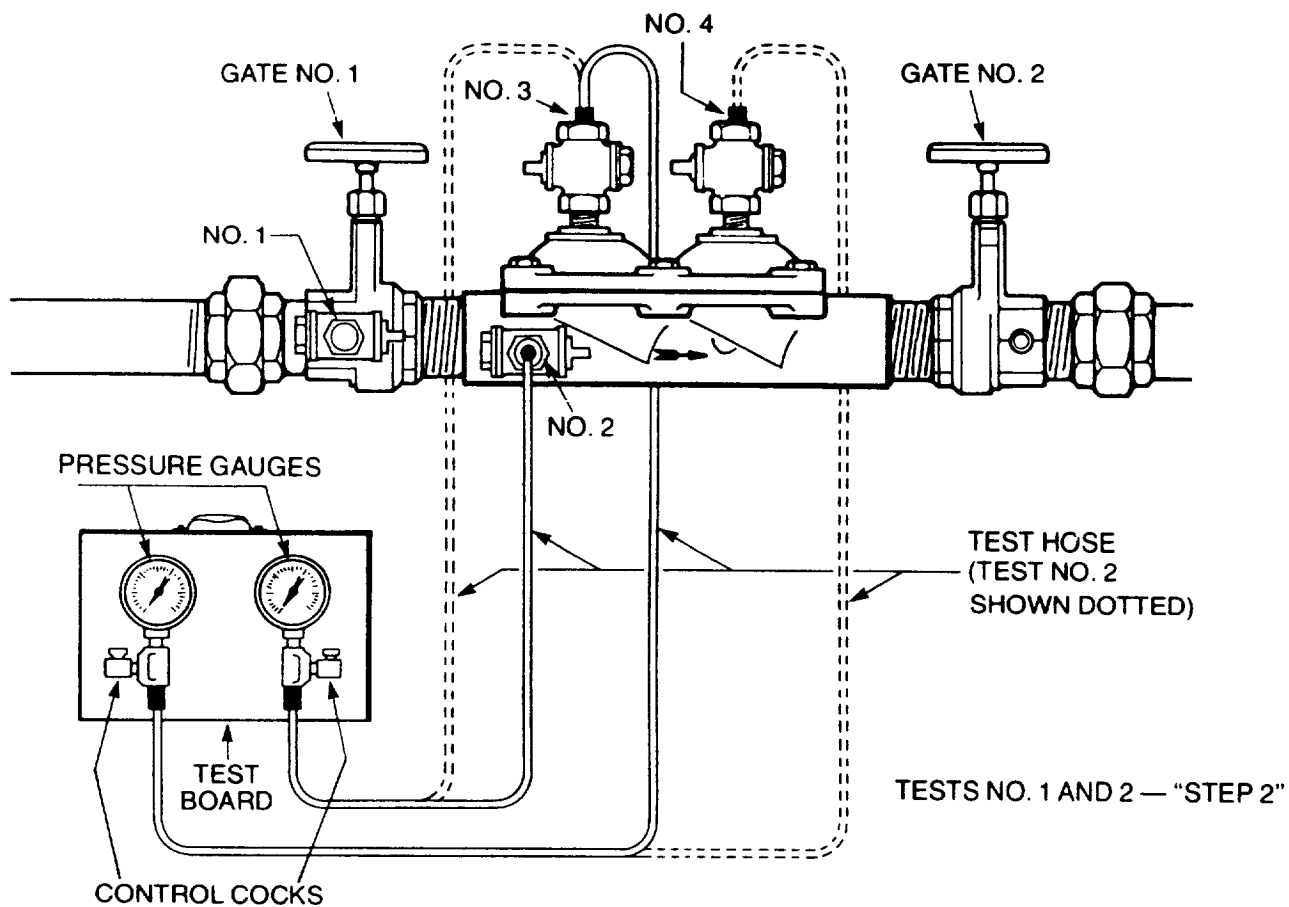


Figure 16. PRESSURE GAUGES INSTALLED ON FDC  
DOUBLE CHECK VALVE ASSEMBLY

### FDC Section III-Replacement Parts

#### A. 3/4" - 1" MODEL FDC DOUBLE CHECK VALVE ASSEMBLY

Description	Part No.
Check Valve Kit	65556 (2)
Bottom Case (3/4")	65528
Bottom Case (1")	65601
Top Case	65531
Case Gasket	65534
Test Cocks	96339 (3)
Check Valve Mounting	
Screws	98116 (4)
Case Bolts	90026 (6)

#### B. 1 1/2" - 2" MODEL FDC DOUBLE CHECK VALVE ASSEMBLY

Description	Part No.	
	1 1/2"	2"
Check Valve Kit	65527 (2)	65545 (2)
Bottom Case	65559	65574
Top Case	65560 (2)	65578 (2)
Case Gasket	65568 (2)	65595 (2)
Test Cocks	96339 (3)	96339 (3)
Check Valve		
Mounting Screws	98174 (8)	98174(8)
Case Bolts	90028 (12)	90028 (16)







# **INSTALLATION MAINTENANCE, AND TEST INSTRUCTIONS**

**BEECO MODEL 6CM REDUCED  
PRESSURE PRINCIPLE  
BACKFLOW PREVENTER**



**HERSEY MODEL NO. 2  
DOUBLE CHECK  
VALVE ASSEMBLY**

**BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736**

## GENERAL INFORMATION

Beeco® Model 6CM Reduced Pressure Principle Backflow Preventers and Hersey No. 2 Double Check Valve Assemblies are designed and manufactured to give long, troublefree service in safeguarding public and private water systems from pollution or contamination caused by cross-connections. However, to insure proper operation, each device should be tested at least annually (or as prescribed by authorities having jurisdiction), and after each repair operation.

Rubber parts, which include valve discs, relief valve diaphragms and small o-rings should be replaced at least every five years or as prescribed by authorities having jurisdiction (see replacement valve kits).

Special test kits and repair tools are required to repair and test these devices. Model 6CM and No. 2 repair tools and test kits are listed in this manual.

If service by the manufacturer is preferred, factory-trained field service engineers are available. Contact Hersey Total Service at (214) 423-7359 for details.

## PARTS ORDERING INSTRUCTIONS

Please state name of part, part number and quantity required. If applicable, also state model, size and serial number of device for which parts are intended.

## PARTS LISTS ACCURACY

Each entry has been checked for accuracy. However, should any question arise regarding the proper description, part number, quantity or list price of any item or items listed in this parts catalog, Hersey Products Inc. reserves the right to determine the applicable description, part number, quantity or list price.

## HERSEY LIMITED WARRANTY

Hersey Products ("Hersey") warrants for a period of one year from the date of sale (warranty period) that the product(s) sold hereunder are free from defects in material and workmanship. Our obligation under this warranty is limited to repair or replacement, or, at our option, we will repay the price paid for the product(s), plus any transportation charge paid by the purchaser. In the case of replacement, we will pay the transportation charges to the location of the defective product. We must be given the opportunity to inspect any product you believe to be defective. To make a claim under this limited warranty, contact Hersey Customer Service.

THERE ARE NO OTHER WRITTEN OR ORAL WARRANTIES. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE DURATION OF THE LIMITED WARRANTY SET FORTH ABOVE.

Hersey does not assume any other obligation in connection with the sale of the product(s) by purchaser.

This warranty shall not apply to any product(s) which have been installed in violation of written instructions furnished by the manufacturer, repaired or altered, misused or damaged, or not properly maintained.

UNDER NO CIRCUMSTANCES WILL HERSEY BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE USE OF THE PRODUCT(S).

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# DESCRIPTION, OPERATION AND INSTALLATION INSTRUCTIONS MODEL 6CM REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS

## DESCRIPTION (see Fig. 1)

The BEECO Reduced Pressure Principle Backflow Preventer operates on the principle that water will not flow from a zone of lower pressure to one of higher pressure. It provides protection against backflow caused by both backpressure and backsiphonage.

The device consists of two spring-load check valves (A and B) and a spring-loaded, diaphragm-actuated differential pressure relief valve (C) located in the zone between the check valves.

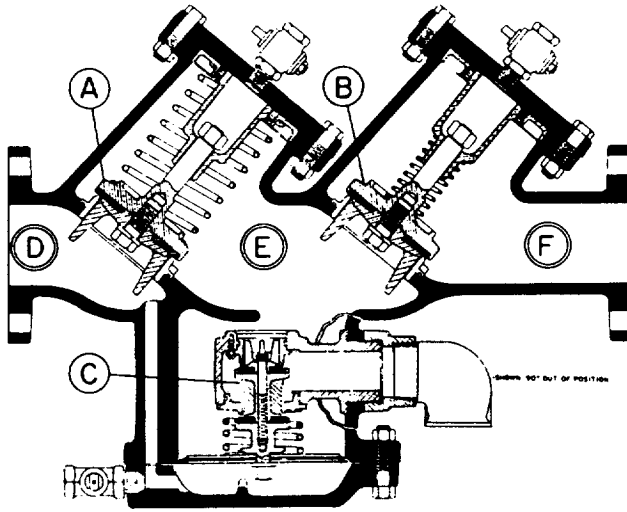


FIGURE 1

## NORMAL OPERATION

The first check valve (A) causes all water passing through it to be automatically reduced in pressure by approximately 8 psi.

The second check valve (B) is lightly spring-loaded and forms the "double check" feature of the device. It acts to prevent unnecessary drainage of the domestic system in case a backflow condition occurs.

The relief valve (C) is spring-loaded to remain open, and diaphragm actuated to close by means of differential pressure.

To illustrate the operation, assume water, having a supply pressure of 60 psi, is flowing in a normal direction through the device. If all valves beyond area F are closed, creating a static condition, the water pressure in area D will be 60 psi and water pressure between the check valves (E) will be 52 psi.

The inlet pressure of 60 psi is transmitted through a cored passageway to the underside of the diaphragm of the relief valve (C). This valve is spring-loaded to remain in an open position until the differential pressure amounts to approximately 4 psi across the relief valve.

During normal operation, therefore, the 8 psi differential pressure produced by the first check valve (A) exceeds the spring-loading of the relief valve (C) and caused the relief valve (C) to remain closed.

## BACKFLOW

There are two conditions that tend to produce backflow:

**Backsiphonage** — where the pressure in the drinking water system becomes less than atmospheric due to a vacuum or partial vacuum in that system.

**Backpressure** — where the pressure in the non-potable system exceeds that in the drinking water system.

## BACKSIPHONAGE

As the supply pressure drops in area D, it also drops in the area below the diaphragm of the relief valve (C). When the pressure differential across the diaphragm decreases to approximately 4 psi, the relief valve (C) will start to open. This happens because the spring above the diaphragm of the relief valve (C), which is trying to force the valve open, is designed to compress with a differential pressure of 8 psi. When that differential is decreased to 4 psi, the spring will extend and cause the relief valve (C) to start to open.

This spring-loaded relief valve is designed to eliminate intermittent discharges and "spitting" with normal minor fluctuations in the line pressure.

As the supply pressure continues to drop, the relief valve (C) automatically continues to drop, the relief valve (C) automatically continues to drain and, regardless of the pressure on the supply side, approximately 4 psi less pressure will be maintained between the check valves (zone E). This will cause continual drainage which will be readily visible at the drain outlet.

## BACKPRESSURE

Assume that pressure at the discharge side (F) increases to 80 psi, while the supply pressure (D) remains at 60 psi:

1. *If the second check valve (B) does not leak*, water under higher pressure in area F will not enter the area between the check valves (zone E), and the pressure in this zone will remain at 52 psi. Under these conditions, the relief valve (C) will remain closed since the 8 psi differential pressure is still being maintained between the supply pressure (area D) and the area of reduced pressure between the check valves (zone E).

2. *If the second check valve (B) does leak*, water under high pressure (area F) will flow into zone E. If the pressure in this zone increases to approximately 56 psi — still 4 psi lower than the supply pressure (area D) — the relief valve will start to open and discharge this reversely flowing water to atmosphere, maintaining the pressure in zone E approximately 4 psi lower than supply pressure. The relief valve will automatically continue to drain as long as this backflow condition exists and as long as the second check valve (B) is leaking.

If for any reason the first check valve (A) should leak during a shutoff beyond area F, the water under higher pressure in area D will leak into zone E. This will cause the relief valve to open as previously described and, again, provide visual indication at the drain outlet.

In the unlikely event that the relief valve diaphragm should rupture, an unbalanced condition between area D and zone E will occur, and the relief valve will immediately discharge to atmosphere.

## INSTALLATION — GENERAL COMMENTS

### A. WARM CLIMATE ABOVE GROUND INSTALLATION (Fig. 2)

Reduced pressure backflow preventers should be installed only where there is adequate drainage. At no time should they be placed where any part of the unit could be submerged in standing water.

The most satisfactory installation is above ground. This type of installation is recommended wherever practical. Support should be provided for the larger sizes (3" and up). A concrete slab under the unit is sometimes desirable.

Normally, any discharge from the relief valve is spilled onto the ground through the drain outlet. Drainage may be piped away from the location, in which case an air gap should be used between the relief valve outlet and the drain line.

### B. COLD CLIMATE INDOOR INSTALLATION (Fig. 3)

In climates where freezing conditions are likely or where it is impractical to install the backflow preventer above ground, the installation should be made in an easily accessible location inside a building.

The unit should be placed above the floor at a distance great enough to allow clearance for repair work. If the backflow preventer is positioned against a wall, care should be taken to be sure that the four test cocks are easily accessible. Proper drainage should be provided for the relief valve. An air gap should be used between the relief valve outlet and the drain line if drainage is to be piped away.

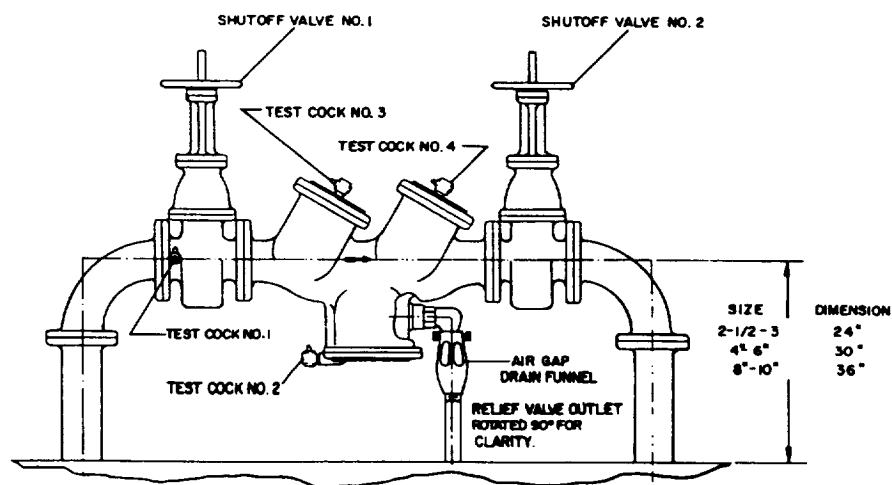


FIGURE 2  
ABOVE GROUND INSTALLATION

In remote locations or where installation cannot be made in a heated building, a separate insulated structure should be built around the backflow preventer and adjacent piping. In extremely cold areas, some form of heat should be provided within the structure. Strip heaters or light bulbs may be sufficient for this purpose.

Recommended Drainline Size  
2½" - 6" 2"  
8", 10" 4"

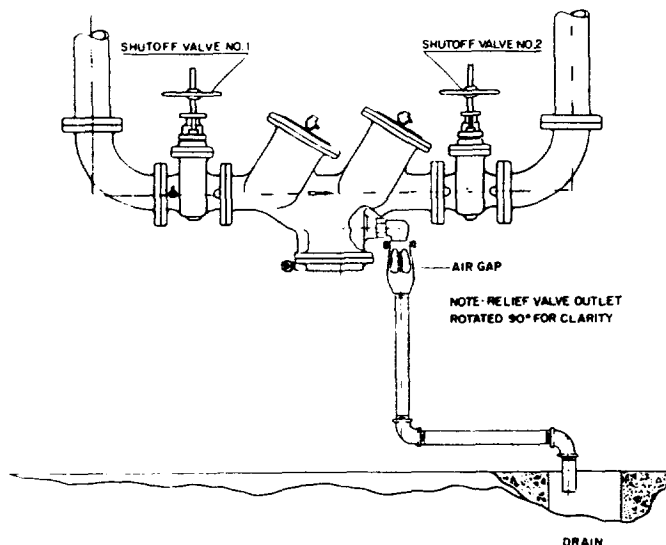


FIGURE 3  
INDOOR INSTALLATION

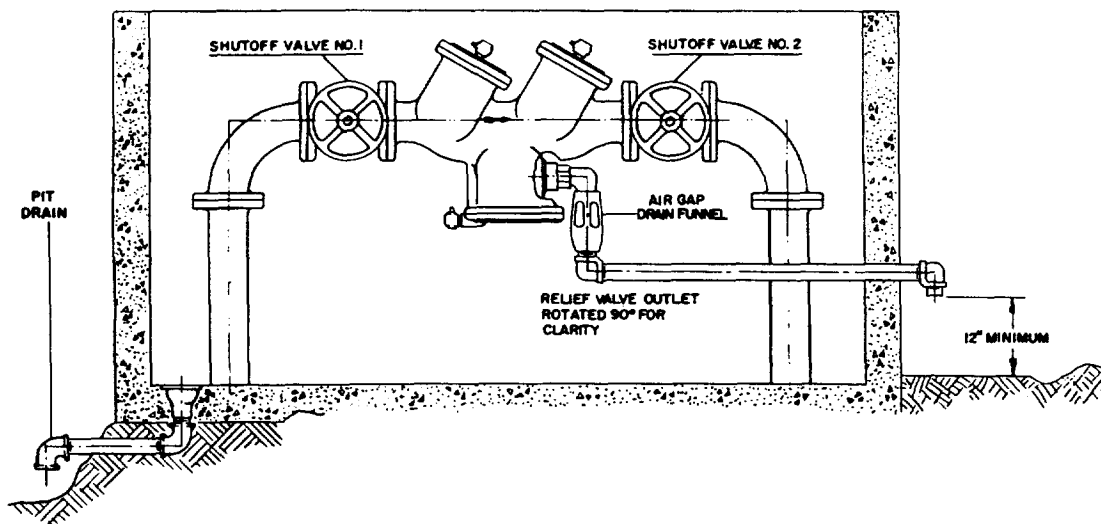


FIGURE 4  
MODIFIED PIT INSTALLATION

### C. MODIFIED PIT INSTALLATION (Fig. 4)

Unless absolutely necessary, it is strongly recommended that backflow preventer *not* be placed in pits. In the event installation must be made in a pit, the modified pit type installation (Fig. 4) is preferable. The relief valve drain should be piped to the outside of the vault and discharged no less than 12" above the grade line; and should not be higher than the Relief Valve Outlet at any point.

## INSTALLATION — SPECIFIC PROCEDURES

- A) Before installing the device, pipelines should be thoroughly flushed to remove foreign matter.
- B) Install the device in a horizontal position in an accessible location to facilitate maintenance. In particular, provide for access to test cocks. Arrow on case must point in direction of flow.
- C) Sufficient clearance must be provided beneath the device to permit removal of the relief valve and housing assemblies. Recommended pipe center line - floor (or ground) dimensions are shown on Figure 2.
- D) In no case should the relief valve discharge be solidly piped into a sump, sewer, drainage ditch, etc. An air gap must be provided between the relief valve opening and the discharge pipe (see Figure 3).
- E) If not already provided with the device, shutoff valves should be installed at each end of the device, so that it can be tested and maintained. The inlet shut off valve must be provided with a test cock for test purposes on its inlet side.
- F) Three testcocks are provided for each device plus one for the inlet gate valve (if device is provided with gate valves). *These must be installed before the device can be placed in operation.* Further information is provided on page 25 on packaging and installation of testcocks and testcock fittings.
- G) This device should be tested upon installation to insure proper operation and then inspected periodically for continual discharge from the relief valve, which indicates a need for maintenance. After installation, with flow through the device, continual discharge from the relief valve opening usually indicates that there is a foreign material holding the relief valve open. To remove foreign material, flush relief valve as follows:
  - 1) Close inlet shutoff valve.
  - 2) Open test cock No. 2. Relief valve should fully open and discharge.
  - 3) Close test cock No. 2.
  - 4) Open inlet shutoff valve.If relief valve continues to leak, repeat procedure. If flushing does not stop discharge with flow through the device, close shutoff valves. Remove and clean the relief valve discs and seats.
- H) After installation, with no flow through device (inlet shutoff valve open, outlet shutoff valve closed) continual discharge from the relief valve indicates a leaking first check valve, probably caused by foreign material under the seat. If flushing (substantial flow through the device) will not clear the device, close shutoff valves. Remove and clean the relief valve discs and seats.
- I) Occasional "spitting" or momentary discharge from the relief valve can be expected, if line pressure drops approximately 4 psi, due to operation of flushometers, quick opening valves, or similar devices and valves.

## DESCRIPTION, OPERATION AND INSTALLATION. HERSEY NO. 2 DOUBLE CHECK VALVE ASSEMBLY

### I. DESCRIPTION AND OPERATION

#### A. DESCRIPTION

The Hersey No. 2 Double Check Valve Assembly consists of two independent spring-loaded poppet-type check valve assemblies, mounted in series in a common body. Two gate valves and four test cocks for field testing complete the assembly. For ease of repair, the valve assemblies are removable from the top of the device, making possible in-line maintenance without removing the device from its setting. The valves have screwed, replaceable seats, which are sealed by a face o-ring.

#### B. OPERATION

Under normal operating conditions, the check valves remain closed until there is a demand for water. Each of the two check valves is designed to open at a one psi pressure differential in the direction of flow. In the event pressure increases downstream of the device, tending to reverse the direction of flow, both check valves are closed to prevent backflow. If the second check valve is prevented from closing tightly, the first check valve will still provide protection from a backflow condition.

## II INSTALLATION - GENERAL COMMENTS

### A. WARM CLIMATE ABOVE GROUND INSTALLATION (Fig. 5)

Double Check Valve Assemblies should be installed only where there is adequate drainage. At no time should they be installed where any part of the unit could be submerged in standing water.

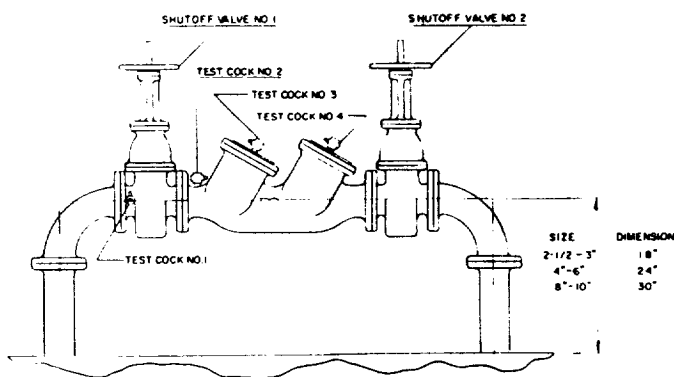


FIGURE 5  
ABOVE GROUND INSTALLATION

The most satisfactory installation is above ground. This type of installation is recommended wherever practical. Support should be provided for the larger sizes (3" and up). A concrete slab under the unit is sometimes desirable.

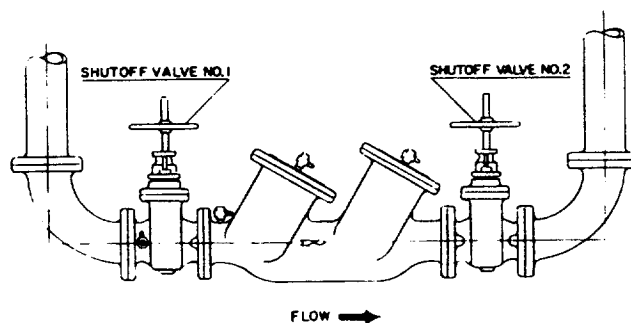


FIGURE 6  
INDOOR INSTALLATION

### B. COLD CLIMATE INSTALLATIONS (Fig. 6)

In climates where freezing conditions are likely or where it is impractical to install the backflow preventer above ground, the installation should be made in an easily accessible location inside a building.

In remote locations or where installation cannot be made inside a heated building, a separate insulated structure should be built around the backflow preventer and adjacent piping. In extremely cold areas, some form of heat should be provided within the structure. Strip heaters or light bulbs may be sufficient for this purpose.

### C. MODIFIED PIT INSTALLATION (Fig. 7)

Installation of double check backflow preventers in pits below grade is not recommended. Should the pit be located on a slope, so that a drain can be installed which discharges by gravity to at least 12" above grade, the "modified" pit installation may be used (Fig. 7).



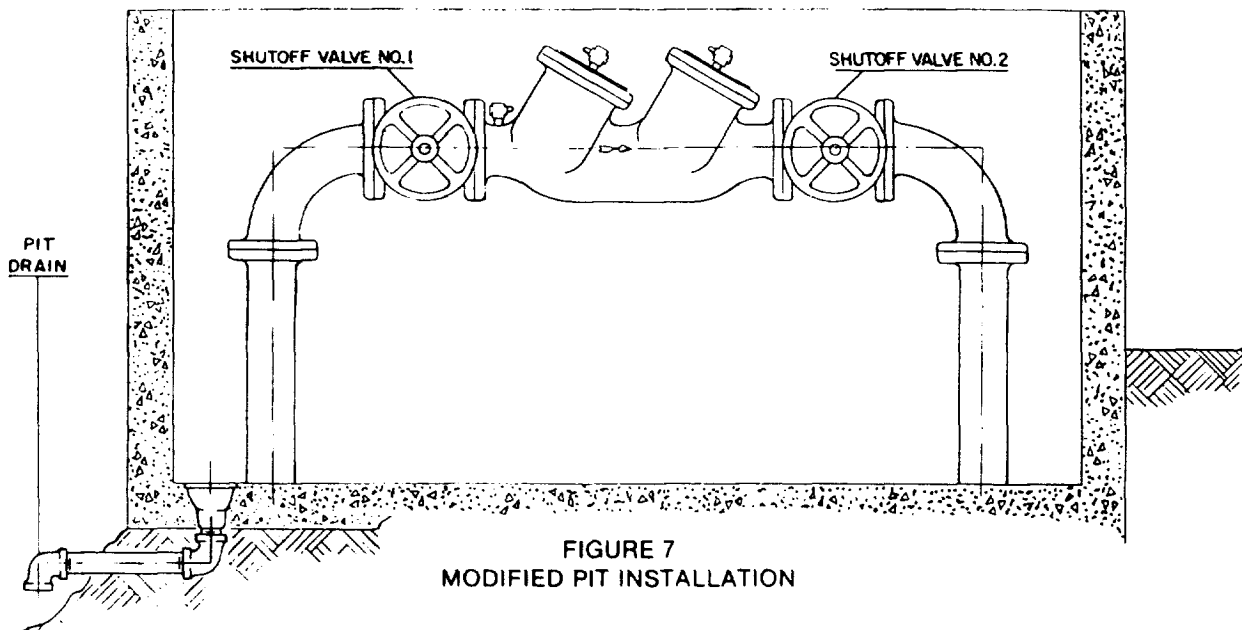


FIGURE 7  
MODIFIED PIT INSTALLATION

### III. INSTALLATION — SPECIFIC PROCEDURES

- A. BEFORE INSTALLING THE DEVICE, PIPELINES SHOULD BE THOROUGHLY FLUSHED TO REMOVE FOREIGN MATTER.
- B. Install the device in a horizontal position in an accessible location. In particular, provide for access to testcocks. Arrow on cases must point in direction of flow.
- C. If not already provided with the device, shutoff valves should be installed at each end of the device so that it can be tested and maintained. The inlet shutoff valve must be provided with a testcock for test purposes on its inlet side.
- D.
  1. If the four testcocks (three on the device and one on the inlet shutoff valve) are not already installed, remove testcocks and nipples from bag attached to the device. \*
  2. Remove plastic protective caps from the four testcock openings.
  3. Install testcock nipples and testcocks, using commercially-available pipe sealant. If pipe compound is used, exercise care to avoid introducing the compound into the device as it may cause a malfunction.
  4. Inspect testcocks to be sure they are closed (operating boss at top of testcock should be at right angles to opening).

\*See notes, p. 25.

### REPAIR PROCEDURES

#### I INTRODUCTION

- A. General Comments
 

Usually, it is possible to determine which internal subassemblies require maintenance by observing or testing the backflow preventer. Complete subassemblies, where time is limited, may be installed.
- B. Rubber Parts
 

Rubber wearing parts should be replaced every five years, or sooner if necessary. These include the two check valve discs, relief valve discs and relief valve diaphragm. Rubber parts kits which include these parts and all necessary gaskets and o-rings are listed in this manual.
- C. Springs
 

Springs rarely require replacement. However, it is advisable to inspect springs for corrosion, pitting or breakage.
- D. Valve Seats
 

Check Valve and relief valve seats should be smooth and clean. The rubber valve discs will seal properly on seats with minor imperfections. If seats are worn considerably, pitted or corroded, they should be replaced.
- E. Other Working Parts
 

Inspect disc holders, spacers and valve guides for evidence of excessive wear or corrosion. Replace worn or corroded parts.

# REPAIR PROCEDURES

## II. MAIN AND CHECK VALVES

### A. MAIN OR CHECK VALVE ASSEMBLIES, DISCS, SEATS, & O-RINGS.

2 1/2", 3", 4", & 6" MODEL 6C-M & HERSEY NO. 2

1. Close inlet and outlet shutoff valves.
2. Open testcocks 2, 3, & 4 to release pressure.
3. Remove main valve cover bolts and nuts (the 2 1/2" bronze 6C-M has hex cap screws only).
4. Remove the main valve cover and gasket.
5. Insert the proper eyebolts into the threaded holes on the top of the spring retainer, and lift the entire main valve assembly out of the body.
6. a) Remove the eye bolts and place the assembly so it rests on a flat surface with its guide fingers pointing up, to permit cleaning of the disc.  
b) Remove the hex cap screw and guide to release the main valve disc, if it is to be replaced.
7. Replace the guide and tighten the hex cap screw. Replace the eyebolts in the spring retainer. Place the assembly aside.
8. Remove the main valve seat, unscrewing it counter-clockwise with the 6C-M seat removal tool (Be careful not to damage the seat face when seating the tool).
9. Replace the seat and the seat o-ring, if required. (Lubricate o-ring with vaseline to hold it in place).
10. Tighten the seat (again being careful not to damage the seat face), until resistance is felt.
11. Carefully lower the main valve assembly into the body (being careful the the guide fingers do not damage the seat face).
12. Remove the eyebolts from the spring retainer; replace the cover gasket and cover.
13. Tighten the cover bolts and nuts and repeat steps 3 thru 13 for the check valve assembly.
14. Close testcocks.
15. Open inlet and outlet valves.

### B. MAIN OR CHECK VALVE SPRING, SPRING RETAINER AND DISC HOLDER 2 1/2", 3", 4" & 6" MODEL 6C-M & HERSEY NO. 2

NOTE: This operation should not be performed unless replacement of one of the above parts is required. The spring exerts a strong force against the spring retainer and caution is advised when this operation is done.

1. Close inlet and outlet shutoff valves.
2. Open testcock 2, 3, & 4 to release pressure.
3. Remove main valve cover bolts and nuts (The 2 1/2" bronze 6C-M has hex cap screws only).
4. Remove the main valve cover and gasket. Leave the check valve assembly in the body.
5. a) Attach the two threaded rods of the spring removal tool to the main valve flange with the nuts and washers provided.  
NOTE: The 2 1/2" bronze 6C-M has threaded holes on the main valve flange. The rods must be screwed in the flange of this type of unit.  
b) Fully tighten the nuts on the top and bottom of the main valve flange.
6. Slide the spring removal plate down on the rods to rest on the nuts, and securely tighten the nuts and washers on the top of the plate.
7. Remove the spring retainer nut.
8. Gradually loosen the top rod nuts to allow the spring to relax. *Caution! Check rods to make sure they are not turning. Retighten flange nuts if necessary.*
9. When the spring is fully relaxed, remove the plate. The spring, spring retainer or the disc holder can now be replaced.
10. To reassemble, reverse steps 1 thru 9.
11. Repeat procedure for check valve.

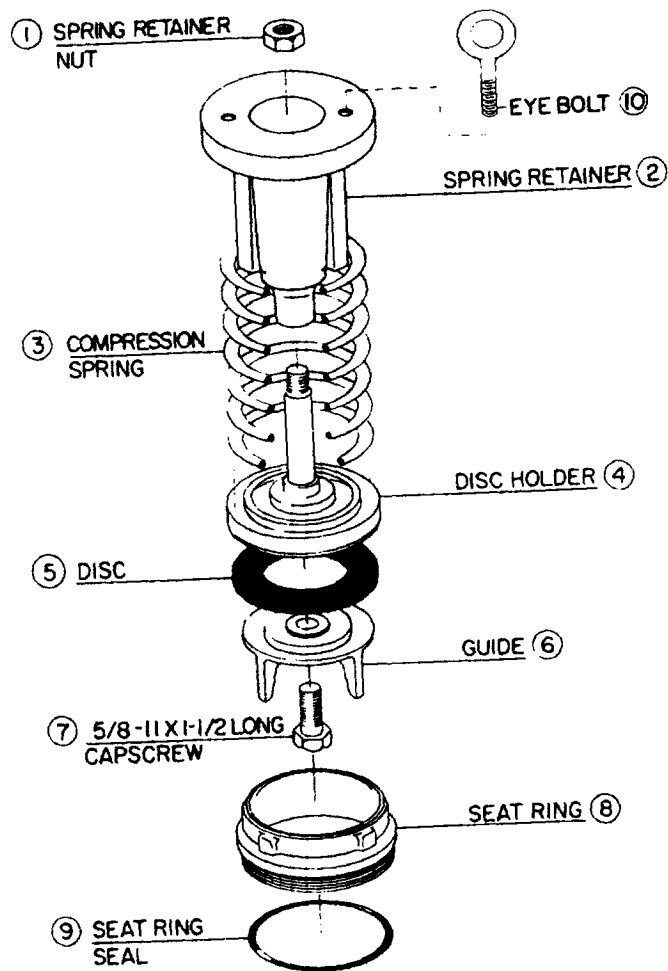


FIGURE 8  
MAIN VALVE ASSEMBLY  
2½"-6" MODEL 6CM

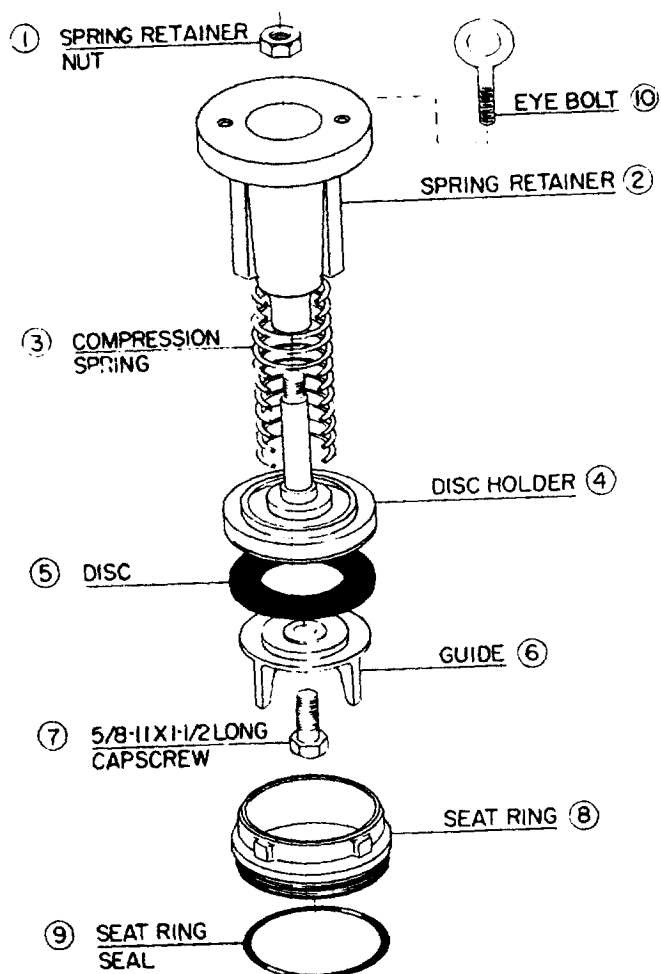


FIGURE 9  
CHECK VALVE ASSEMBLY  
2½"-6" MODEL 6CM

### III RELIEF VALVE ASSEMBLY AND HOUSING ASSEMBLY

#### 2 1/2", 3", 4" & 6" MODEL 6C-M

1. Close inlet and outlet shutoff valves.
2. Open testcocks 2, 3 and 4 to relieve pressure.
3. Remove all but two relief valve cover bolts and nut, loosen these.

Note: If cover adheres to body, strike cover at junction of body and cover to break it free. Should diaphragm adhere to body or cover separate it by running knife around flange between diaphragm and body of cover. At this point, relief valve assembly should drop on cover.

4. Support cover and remove remaining bolts to release cover and valve assembly from body.

Note: If relief valve did not drop on cover, remove cover. Grasp diaphragm on opposite sides and slowly pull down (adhesion of lower seat o-ring to relief valve housing may cause valve to remain in position).

5. To disassemble relief valve:
  - a) Place the assembly on a flat surface, with the guide fingers pointing down.
  - b) Press down on lower diaphragm plate to maintain spring in compression. At the same time, loosen the clamp nut (to facilitate this operation, it may be desirable to have one person hold the spring in compression and a second remove the nut). Release pressure on diaphragm plate. Plate should rise against nut. If it does not, tap upper diaphragm plate to release adhesion of diaphragm plate gasket. Press down on diaphragm plate and remove clamp nut.
  - c) Slowly release pressure on the diaphragm plate until spring extends fully. Remove diaphragm plates, diaphragm, spring and diaphragm plate gasket from balance of assembly.
  - d) Remove assembly screw and separate upper seat guide, upper disc, upper stem, lower disc, lower stem and lower seat. Discs and other parts may now be cleaned or replaced.

Note: Rubber discs may tend to stick to stems after assembly screw is removed.

6. To reassemble relief valve:
  - a) Place discs on lower and upper stems, and assemble lower seat to upper stem, and upper stem to lower stem (projection on stem goes into hole in disc). Place guide on upper stem (projection on guide goes into hole on disc). Replace assembly screw.
  - b) Rest assembly on flat surface, guide fingers pointing down. Place diaphragm plate gasket and spring on lower stem.
  - c) Place diaphragm between diaphragm plates and rest upper plate on spring.
  - d) Press on lower diaphragm plate until threaded end of lower stem appears in hole on plate. Replace lockwasher and clamp nut, and release plate.

Note: Apply vaseline to lower seat o-ring (seal) before assembling to seat. If original o-ring is left in place, apply vaseline to it.

7. To disassemble RV housing assembly, first unscrew housing nut (do not apply pressure to elbow). Then remove the assembly by sliding it in and down, out of the body. The RV housing gasket which fits over the two locating pins on the housing flange can now be replaced.
8. Remove the three screws and lock washers that hold the upper seat in the housing. The o-ring (upper seat seal) or the seat itself can now be replaced. Note: Apply vaseline to o-ring before assembling to seat.
9. To reassemble:
  - a) Press upper seat into place and fasten screws.
  - b) Place housing in body, being careful to align pins with holes on body. Attach housing nut. Be sure elbow points down. Reattach drain funnel assembly if device is so equipped.
10. Rotate relief valve so that hole in diaphragm for internal passageway in body aligns with body opening. Lift RV assembly up into body, inserting upper seat guide fingers into upper seat opening. Note: Avoid contact of guide fingers with upper seat.  
Hold relief valve in position, and assemble RV cover and cover bolts to body.
11. Close testcocks 2, 3, and 4 and open shut off valves.

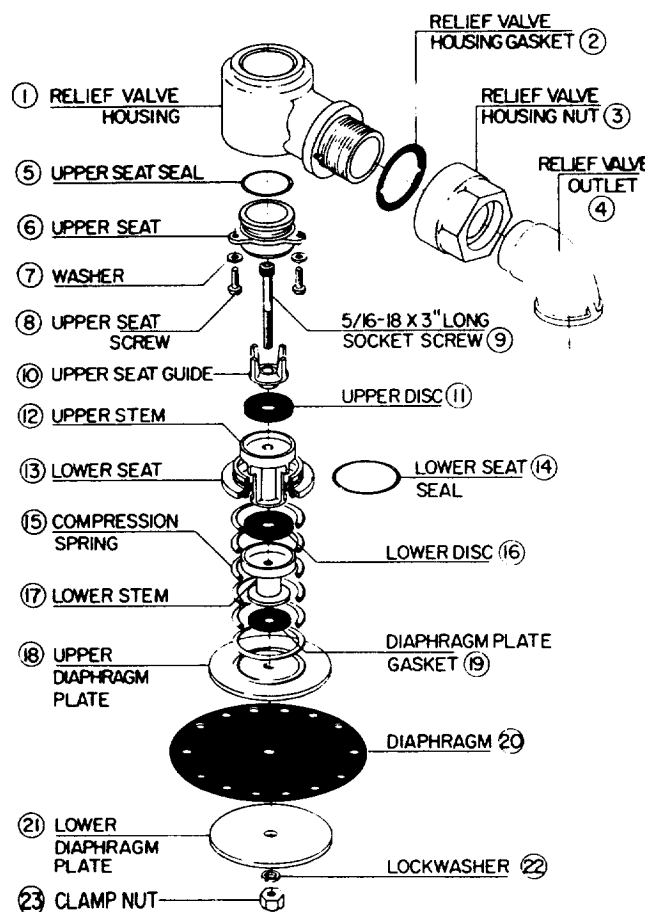


FIGURE 10  
RELIEF VALVE ASSEMBLY  
AND HOUSING ASSEMBLY  
2 1/2"-6" MODEL 6CM

# IV MAIN AND CHECK VALVE ASSEMBLIES AND SEATS 8" & 10" MODEL 6CM & HERSEY NO. 2

1. Close inlet and outlet shutoff valves.
2. Open testcocks 2, 3 and 4 to relieve pressure.
3. Remove valve cover bolts and nuts.
4. Remove valve cover and gasket, using eyebolt provided.
5. Insert eyebolts (see parts list, page 14) into the threaded holes on the top of the spring retainer, and lift the entire valve assembly out of the body (at this point, the valve seat may be replaced if necessary).
6. a) Remove the eyebolts and place the assembly so that it rests on a flat surface with its guide fingers pointing up, to permit cleaning of the disc.  
b) Remove the hex cap screw and guide. The disc can now be replaced, if necessary.
7. Reassemble the guide to the disc holder.
8. To remove and replace spring, follow procedure below:
  - a) Place valve assembly back in body of device.
  - b) Attach the two threaded rods of the spring removal tool to the valve flange with the nuts and washers provided, and tighten the nuts fully.

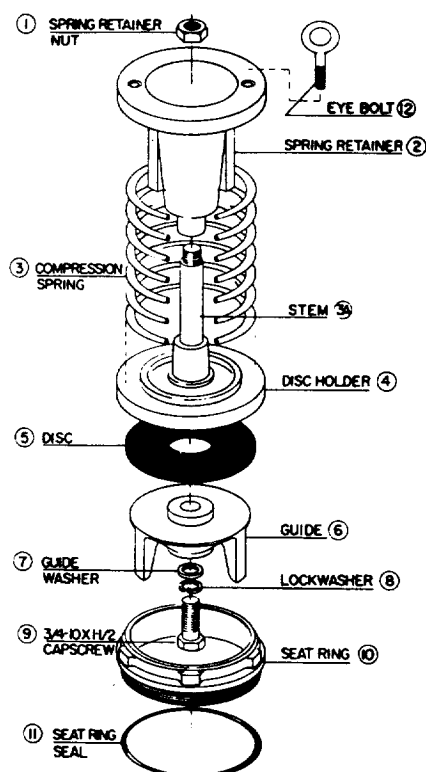


FIGURE 11  
MAIN VALVE ASSEMBLY  
8" & 10" MODEL 6CM

- c) Slide the spring removal plate down on the rods to rest on the hex nuts, and tighten the top nuts and washers against the plate.
- d) Remove the spring retainer nut from the valve assembly.
- e) Gradually loosen top rod nuts to allow spring to relax (use extreme caution until the spring is fully relaxed).
- f) Remove the tool plate, spring retainer and spring.
- g) Place new spring on disc holder. Place spring retainer on spring.
- h) Reassemble tool plate, nuts and washers to threaded rods.
- i) Tighten nuts until spring is compressed sufficiently to permit replacement of spring retainer nut.
- j) Loosen tool plate nuts and remove tool.
- k) Replace gasket and cover; close testcocks 2, 3, 4; and open shutoff valves.

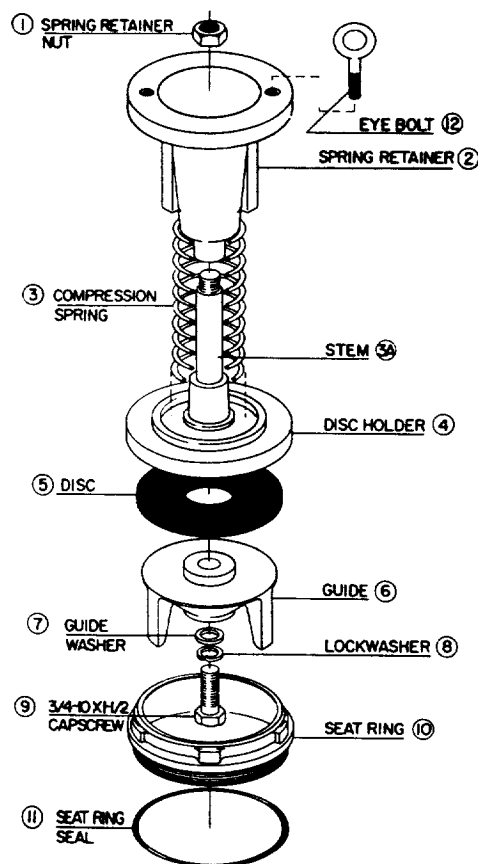


FIGURE 12  
CHECK VALVE ASSEMBLY  
8" & 10" MODEL 6CM

## V RELIEF VALVE ASSEMBLY AND HOUSING ASSEMBLY

### 8" AND 10" MODEL 6C-M

Relief valve assembly and housing assembly, 8" and 10" Model 6CM.

1. Close inlet and outlet shutoff valves.
2. Open testcocks 2, 3 and 4 to relieve pressure.
3. Remove all but two relief valve cover bolts and nuts, loosen these.

Note: If cover adheres to body, strike cover at junction of body and cover to break it free. Should diaphragm adhere to body or cover separate it by running knife around flange between diaphragm and body or cover. At this point, relief valve assembly should drop on cover.

4. Support cover and remove remaining bolts to release cover and valve assembly from body.

Note: If relief valve did not drop on cover, remove cover. Grasp diaphragm on opposite sides and slowly pull down (adhesion of lower seat o-ring to relief valve housing may cause valve to remain in position).

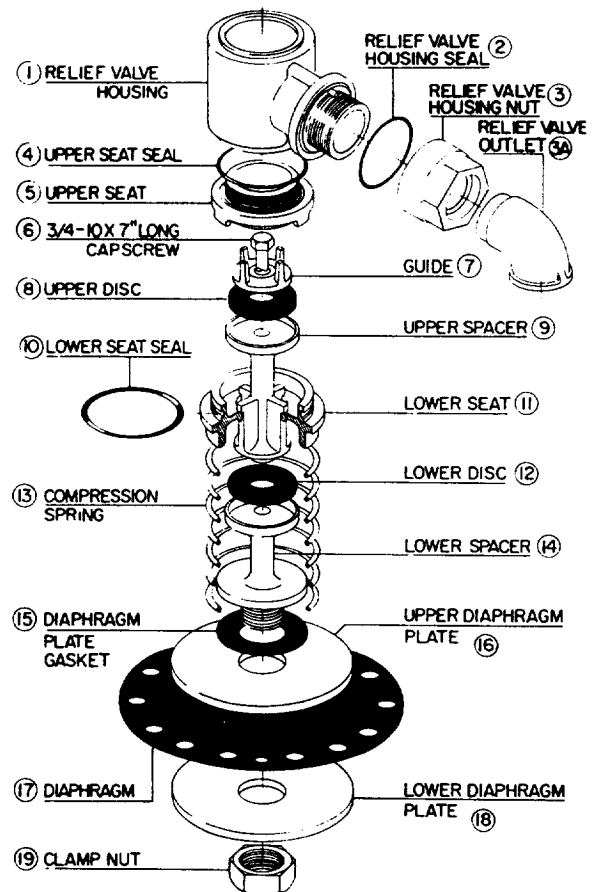
5. To disassemble relief valve:
  - a) Place assembly in an arbor press with the guide facing up.

*Caution: Do not attempt to disassemble by compressing spring by hand. Substantial spring force could cause injury if spring compression is released suddenly.*

- b) Press on lower seat, compressing spring slightly to release tension on assembly screw.
- c) Holding spring in compression, remove assembly screw.
- d) Slowly release pressure until spring is fully extended. Remove guide, upper spacer, lower seat, discs and spring from the balance of the assembly. The discs and lower seat seal (o-ring) may now be replaced. (lubricate o-ring).
- e) If diaphragm is to be replaced, remove clamp nut from lower spacer. Separate lower spacer, diaphragm plate gasket, diaphragm and diaphragm plates. If diaphragm or gasket sticks to other parts, insert knife between them to separate.

6. To reassemble relief valve:
  - a) Reassemble lower spacer, diaphragm, diaphragm plates, diaphragm plate gasket and nut as illustrated.
  - b) Place these parts in arbor press, lower spacer facing up.
  - c) Place lower disc on lower spacer.
  - d) Place spring and lower seat on upper diaphragm plate.
  - e) Insert upper spacer into lower seat, and rest seat on spring.
  - f) Place upper disc on upper spacer, and guide on upper disc (base of guide fits into hole in disc). Insert assembly screw in guide.
  - g) Apply pressure to lower seat until spring is sufficiently compressed to permit engagement of assembly screw threads. Tighten screw in place after checking that upper spacer is properly seated in hole in lower disc. Release pressure on spring.

7. To disassemble relief valve housing assembly:
  - a) Unscrew housing nut (do not apply wrench to elbow), and slide housing in and down, out of the body.
  - b) Unscrew upper seat from housing, if replacement of seat o-ring is indicated.
8. To reassemble relief valve housing assembly:
  - a) Apply vaseline to new or existing housing o-ring and place it on housing.
  - b) If seat was removed, also apply vaseline to o-ring prior to reassembly of seat.
  - c) Slide housing through hole in body, carefully aligning locating pins with holes in body. Replace nut and elbow. Be sure elbow faces downward. Reattach drain funnel assembly if device is so equipped.
9. Rotate relief valve so that hole in diaphragm for internal passageway in body aligns with body opening. Lift RV assembly up into body, inserting upper seat guide fingers into upper seat opening. Note: Avoid contact of guide fingers with upper seat.
10. Hold relief valve in position, and assemble RV cover and cover bolts to body.
11. Close testcocks, 2, 3, and 4 and open shut off valves.



# MODEL 6CM MAIN & CHECK VALVE PARTS

## 2½" - 6" 6CM MAIN AND CHECK VALVE PARTS

If more than one part is required per valve assembly, quantity is indicated in parentheses after part number.

C.I.: Cast Iron Case

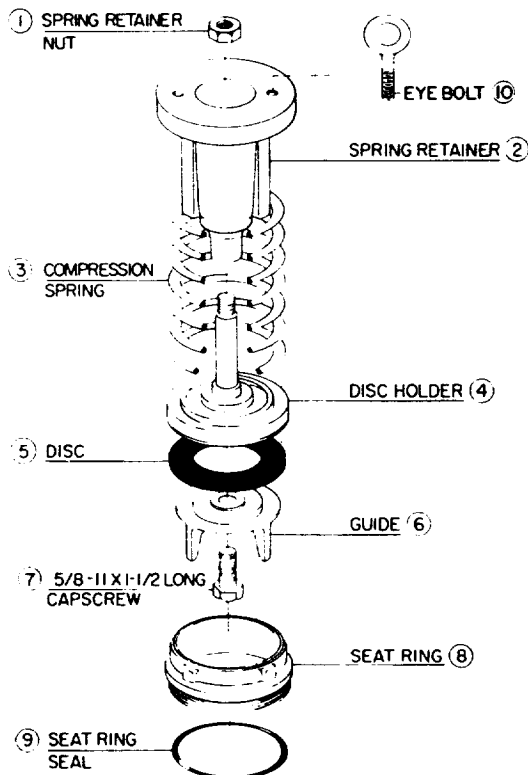
BRZ: Bronze Case

C.W.: Cold Water

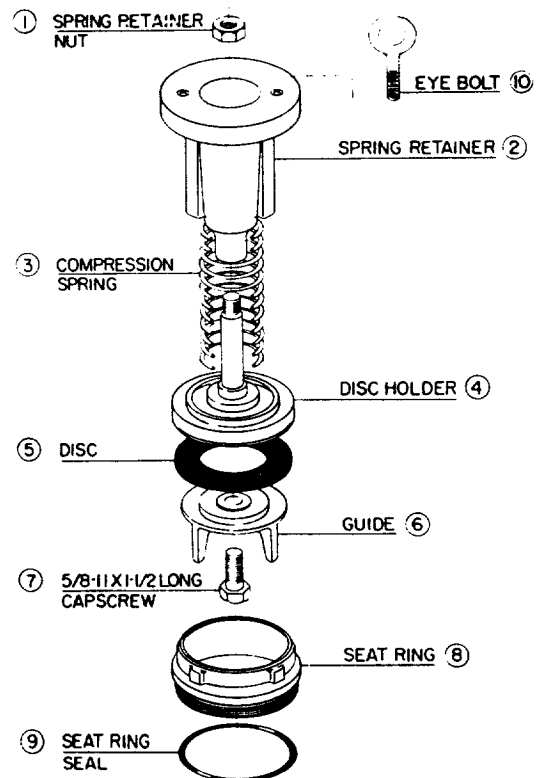
H.W.: Hot Water

All 3"-6" parts are interchangeable between cold water and hot water models, and between iron case and bronze case models, except as noted. All 2½" parts are for cold or hot water bronze case device only.

Illus. No.	Description	2½" Part No.	3" Part No.	4" Part No.	6" Part No.
	MV & CV Cover Bolt (Brz.)	90114(8)	90129(8)	90129(14)	90135(16)
	MV & CV Cover Bolt (C.I.)	90117(2)	90129(8)	90168(14)	90292(16)
	MV & CV Cover Bolt (C.I.)	90124(6)			
	MV & CV Cover Nut (C.I.)	90112(6)	90151(8)	90151(14)	90251(16)
	MV & CV Cover (C.I.)	63527	63302	63402	63602
	MV & CV Cover (Brz.)	63502	63327	63427	63627
	MV & CV Cover Gasket (Brz.)	63504	63304	63404	63604
	MV & CV Cover Gasket (C.I.)	63552			
1	MV & CV Spring Retainer Nut	90069	90260	90336	90336
2	MV & CV Spring Retainer	63509	63309	63409	63609
3	MV Spring	63507	63307	63407	63607
3	CV Spring	63508	61388	62304	61485
4	MV & CV Disc Holder	62112	61832	61852	61892
5	MV & CV Disc	62331	62334	62335	63605
6	MV & CV Guide	63511	63311	63411	63611
7	MV & CV Guide Cap Screw	90172	90282	90282	90382
8	MV & CV Seat	63506	63306	63406	63606
9	MV & CV O-Ring (C.W.)	98339	98335	98336	98337
9	MV & CV O-Ring (H.W.)	98349	98350	98351	98352
10	Eyebolt	90197	90197	90198	90198
1-7	MV Assembly Complete	63512	63312	63412	63612
1-7	CV Assembly Complete	63513	63313	63413	63613



**FIGURE 14**  
**MAIN VALVE ASSEMBLY**  
**2½"-6" MODEL 6CM**



**FIGURE 15**  
**CHECK VALVE ASSEMBLY**  
**2½"-6" MODEL 6CM**

# MODEL 6CM MAIN & CHECK VALVE PARTS

8" & 10" Model 6CM main and check valve parts. If more than one part is required per assembly, quantity is indicated in parentheses after part number.

Size 8"

Size 10"

Illus. No.	Description	Part No.	Illus. No.	Description	Part No.
	MV & CV Cover Bolt	90140(2)		MV & CV Cover Bolt	90360(2)
	MV & CV Cover Nut	90358(14)		MV & CV Cover Nut	90372(16)
	MV & CV Cover Bolt	90141(14)		MV & CV Cover Bolt	90371(16)
	MV & CV Cover	63802		MV & CV Cover	63902
	MV & CV Cover Gasket	63804		MV & CV Cover Gasket	63904
1	MV & CV Spring Retainer Nut	90336	1	MV & CV Spring Retainer Nut	90373
2	MV & CV Spring Retainer	63809	2	MV & CV Spring Retainer	63909
3	MV Spring	63807	3	MV Spring	63907
3	CV Spring	63808	3	CV Spring	63908
3A	MV & CV Stem	63852	3A	MV & CV Stem	62238
4	MV & CV Disc Holder	61275	4	MV & CV Disc Holder	62235
5	MV & CV Disc	63810	5	MV & CV Disc	63910
6	MV & CV Guide	61754	6	MV & CV Guide	62236
7	MV & CV Guide Washer	63820	7	MV & CV Guide Washer	63820
8	MV & CV Lock Washer	90337	8	MV & CV Lock Washer	90337
9	MV & CV Guide Capscrew	90381	9	MV & CV Guide Capscrew	90381
10	MV & CV Seat	63806	10	MV & CV Seat	63906
11	MV & CV O-Ring	98343	11	MV & CV O-Ring	98340
1-11	MV Assembly Complete	63812	1-11	MV Assembly Complete	63912
1-11	CV Assembly Complete	63813	1-11	CV Assembly Complete	63913
12	MV & CV Eye Bolt	90198(2)	12	MV & CV Eye Bolt	90199(2)

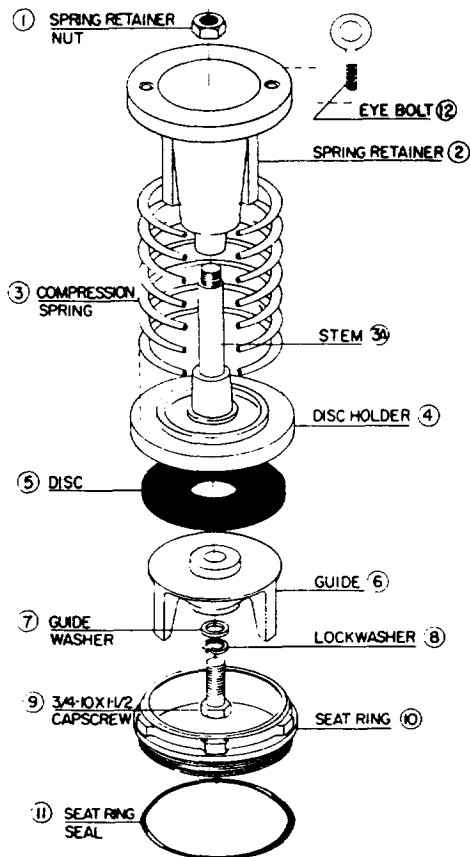


FIGURE 16  
MAIN VALVE ASSEMBLY  
8" & 10" MODEL 6CM

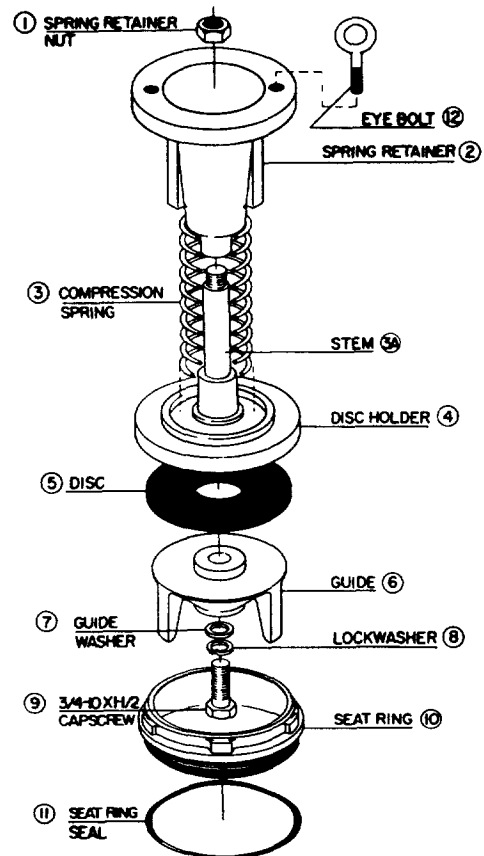


FIGURE 17  
CHECK VALVE ASSEMBLY  
8" & 10" MODEL 6CM



# MODEL 6CM RELIEF VALVE PARTS

2½" - 6" MODEL 6CM RELIEF VALVE AND RELIEF VALVE HOUSING ASSEMBLY

If more than one part is required per assembly, quantity is indicated in parentheses after part number.

C.I.: Cast Iron Case

Brz: Bronze Case

C.W.: Cold Water

H.W.: Hot Water

## Relief Valve Parts

## Relief Valve Housing Assembly Parts

Illus. No.	Description	Part No.	Illus. No.	Description	Part No.
	RV Cover Nut (C.I.)	90151(12)	1	RV Housing	60645
	RV Cover Nut (Brz.) (3"-6")	90112(16)	2	RV Housing Gasket	60644
	RV Cover Bolt (C.I.)	90168(12)	3	RV Housing Nut	63356
	RV Cover Bolt (2½" Brz.)	90114(16)	4	RV Housing Elbow** *	63357
	RV Cover Bolt (Brz.) (3"-6")	90126(16)	5	RV Seat O-Ring (C.W.)	98318
	RV Cover (C.I.)	63303	5	RV Seat O-Ring (H.W.)	98354
	RV Cover (Brz.)	63503	6	RV Upper Seat	60233
9	RV Assembly Bolt	98145	7	RV Lock Washer	98155(3)
10	RV Upper Seat Guide	60230	8	RV Seat Assembly Screw	98165(3)
11	RV Upper Disc	60237	1-8	RV Housing Assembly Complete (C.W.)	63519
12	RV Upper Stem	60231	1-8	RV Housing Assembly Complete (H.W.)	63349
13	RV Lower Seat	60234		Dowel Pin	62313(2)
14	RV O-Ring (C.W.)	98319		*Also order RV Housing Nut if replacing copper elbow.	
14	RV O-Ring (H.W.)	19110		**Not included in assembly. Order separately.	
15	RV Spring	60236			
16	RV Lower Disc	60237			
17	RV Lower Stem	60232			
18	RV Upper Diaphragm Plate	60235			
19	RV Diaphragm Plate Gasket	60239			
20	RV Diaphragm (C.W.) (C.I.)	63305			
20	RV Diaphragm (H.W.)	63345			
20	RV Diaphragm (C.W., Brz.)	63505			
20	RV Diaphragm (C.I., H.W.)	63346			
21	RV Lower Diaphragm Plate	60235			
22	RV Lock Washer	98137			
23	RV Lower Stem Nut	90159			
9-23	RV Assembly Complete (C.I., C.W.)	63314			
9-23	RV Assembly Complete (C.I., H.W.)	63347			
9-23	RV Assembly Complete (Brz., C.W.)	63514			
9-23	RV Assembly Complete (Brz., H.W.)	63348			

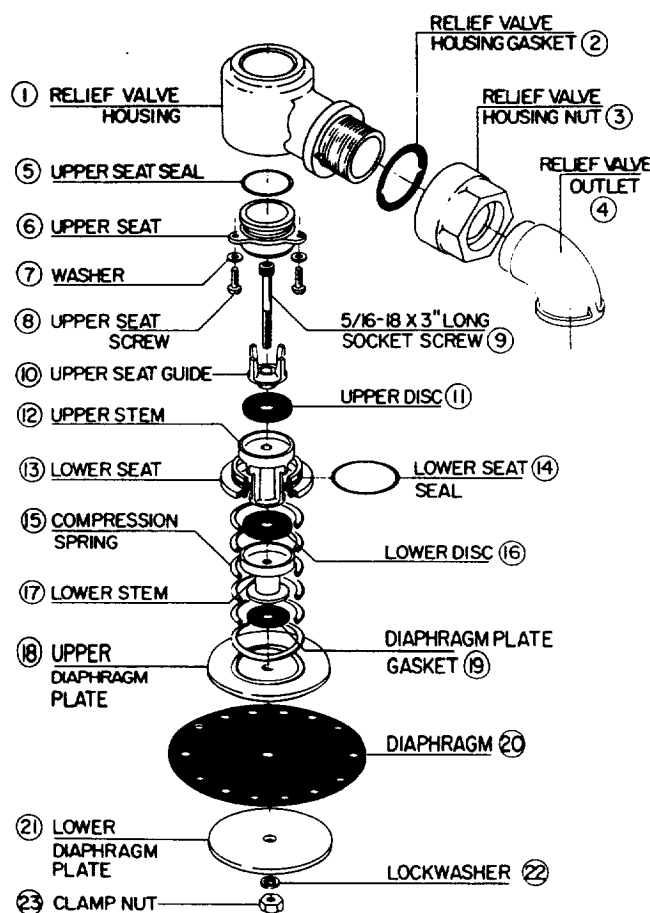


FIGURE 18  
RELIEF VALVE ASSEMBLY  
AND HOUSING ASSEMBLY  
2½"-6" MODEL 6CM

# MODEL 6CM RELIEF VALVE PARTS

8" & 10" Model 6CM relief valve and relief valve housing assembly parts. If more than one part is required per assembly, quantity is indicated in parentheses after part numbers.

## 8" & 10" Relief Valve Parts

## 8" & 10" Relief Valve Housing Assembly Parts

Illus. No.	Description	Part No.	Illus. No.	Description	Part No.
	RV Cover Nut	90301(12)	1	RV Housing	63830
	RV Cover Bolt	90347(12)	2	RV Upper Seat O-Ring	98339
	RV Cover	63803	3	RV Housing Nut	63856
6	RV Assembly Bolt	90346	3A	RV Elbow*	63857
7	RV Upper Seat Guide	63839	4	RV Housing O-Ring*	98342
8	RV Upper Disc	63835	5	RV Upper Seat	63831
9	RV Upper Spacer	63833	1-3, 5	RV Housing Assembly Complete	63819
10	RV O-Ring	98341		Dorvel Pin	61873(2)
11	RV Lower Seat	63832		*Not included in RV Assembly. Order separately.	
12	RV Lower Disc	63835			
13	RV Spring	61503			
14	RV Lower Spacer	63834			
15	RV Diaphragm Plate Gasket	63837			
16	RV Upper Diaphragm Plate	61475			
17	RV Diaphragm	61479			
18	RV Lower Diaphragm Plate	61475			
19	RV Lower Stem Nut	61483			
6-19	RV Assembly Complete	63814			

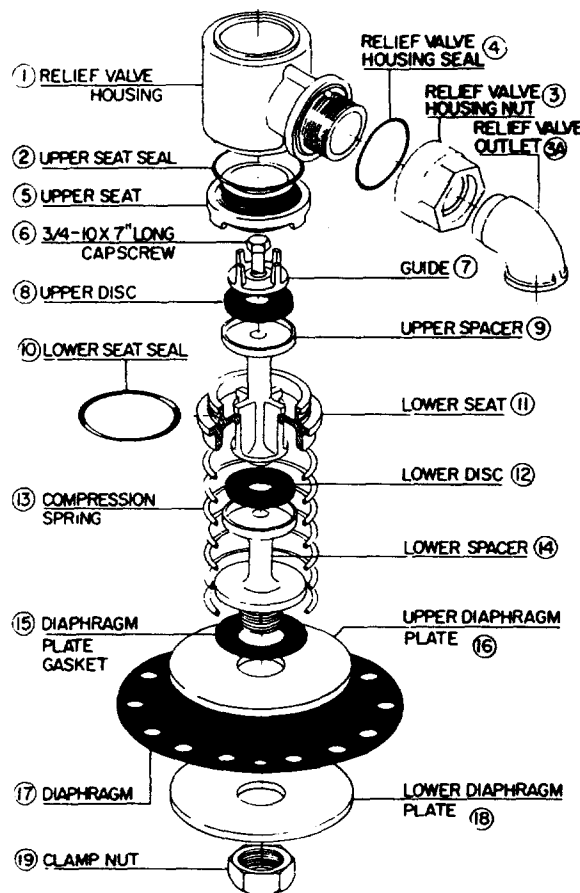


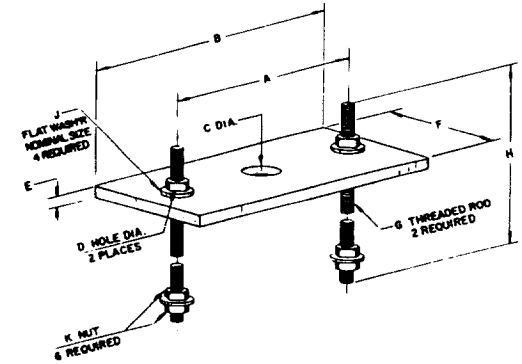
FIGURE 19  
RELIEF VALVE ASSEMBLY  
AND HOUSING ASSEMBLY  
8" & 10" MODEL 6CM

# MODEL 6CM FITTINGS AND TOOLS

If more than one part is required per unit, quantity is indicated in parenthesis after part number.

DEVICE SIZE	DESCRIPTION	PART NO.
2½"	Testcock	96443(3)
3"	Testcock	96443(3)
4"	Testcock	96443(3)
6"	Testcock (Body)	96444(2)
6"	Testcock (R.V. Cover)	96443
8"	Testcock	96444(3)
10"	Testcock	96444(3)
2½"-4"	Inlet Gate Valve Testcock	96443
2½"-4"	Inlet Gate Valve Nipple	96263
2½"-4"	Inlet Gate Valve Coupling	96027
6", 8", 10"	Inlet Gate Valve Testcock	96444
6", 8", 10"	Inlet Gate Valve Nipple	96060
6", 8", 10"	Inlet Gate Valve Coupling	96147

8" and 10" Relief Valve upper seat removal tool - part no. 6162-2 (not illustrated).

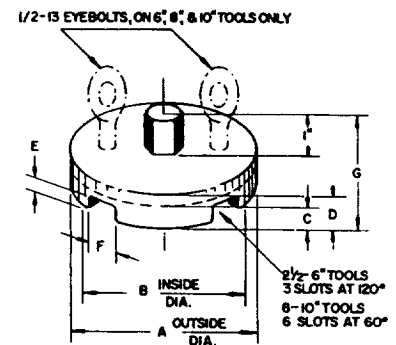


HERSEY PART NO.	SIZE DEVICE	A IN.	B IN.	C IN.	D IN.	E IN.	F IN.	G IN.	H IN.	J IN.	K IN.
63560	2½"	6	7½	1½	1½	1½	4	7/16-14	12½	7/16	7/16-14
63560	3"	7	8½	1¾	1¾	1¾	4	1/2-13	17	1/2	1/2-13
63460	4"	8½	9¾	2	2	2	4	1/2-13	17	1/2	1/2-13
63460	6"	11	13	2	2	2	6	1/2-13	17	1/2	1/2-13
63960	8"	14½	17	2	2	2	8	3/4-10	30	3/4	3/4-10
63960	10"	18	21	2½	2½	2½	6	3/4-10	30	3/4	3/4-10

## SPRING REMOVAL TOOLS (Fig. 20)

## MODEL 6CM MAIN & CHECK VALVE SEAT REMOVAL TOOLS

SIZE	TOOL PART NO.
2 1/2"	63553
3"	63353
4"	63453
6"	63653
8"	63853
10"	63953



## MODEL 6CM SPRING REMOVAL TOOLS

SIZE	TOOL PART NO.
2 1/2"	63560
3"	63360
4"	63460
6"	63660
8"	63860
10"	63960

HERSEY PART NO.	SIZE DEVICE	A IN.	B IN.	C IN.	D IN.	E IN.	F IN.	G IN.
63553	2½"	3 1/16	3 3/8	1 1/16	1 5/16	1 1/4	9/16	1 5/16
63353	3"	4 5/16	4	1 1/16	1 3/8	5/8	1 1/16	1 3/8
63453	4"	5 5/16	5	1 5/16	1 1/2	5/8	1 1/16	2 1/16
63653	6"	7 5/16	7 1/4	1 3/8	1 3/4	5/8	1 1/16	2 3/8
63853	8"	10 3/4	9 5/8	1 1/2	1 3/4	5/8	1 1/16	2 3/8
63953	10"	12 1/2	11 3/16	1 3/4	1 3/4	1"	1 5/16	2 3/8

## MAIN & CHECK VALVE SEAT REMOVAL TOOLS (Fig. 21)

# MODEL 6CM RUBBER PARTS KITS

## HW/Hot Water

If more than one part is required in a device, quantity is indicated in parenthesis after Part Number.

Parts are interchangeable between 2½" - 6" bronze and cast iron assemblies unless indicated otherwise.

DESCRIPTION	PART NO.	PART NO.	DESCRIPTION	PART NO.	PART NO.
	<b>2½" COLD WATER</b>	<b>2½" HOT WATER</b>		<b>6" COLD WATER</b>	<b>6" HOT WATER</b>
RV Disc	60237(2)	60237(2)	RV Disc	60237(2)	60237(2)
Diaphragm Plate Gasket	60239	60239	Diaphragm Plate Gasket	60239	60239
RV Housing Gasket	60644	60644	RV Housing Gasket	60644	60644
MV & CV Disc	62331(2)	62331(2)	MV & CV Disc	63605(2)	63605(2)
MV & CV Cover Gasket (Brz)	63504(2)	63504(2)	MV & CV Cover Gasket	63604(2)	63604(2)
MV & CV Cover Gasket (CI)	63552(2)	63552(2)	RV Diaphragm (CI)	63305	63346
RV Diaphragm (Brz)	63505	63345	RV Diaphragm (Brz)	63505	63345
RV Diaphragm (CI)	63305	63346	O-Ring	98318	19110
O-Ring	98318	19110	O-Ring	98319	98354
O-Ring	98319	98354	O-Ring	98337(2)	98352(2)
O-Ring	98339(2)	98349(2)	Complete Parts Kit (CI)	63650	63654
Complete Parts Kit (CI)	63543	63554	Complete Parts Kit (Brz)	63643	63644
Complete Parts Kit (Brz)	63550	63544			
	<b>3" COLD WATER</b>	<b>3" HOT WATER</b>		<b>8" COLD WATER</b>	
RV Disc	60237(2)	60237(2)	RV Disc	63835(2)	
Diaphragm Plate Gasket	60239	60239	RV Gasket	63837	
RV Housing Gasket	60644	60644	MV & CV Disc	63810(2)	
MV & CV Disc	62334(2)	62334(2)	MV & CV Cover Gasket	63804(2)	
MV & CV Cover Gasket	63304(2)	63304(2)	RV Diaphragm	61479	
RV Diaphragm (CI)	63305	63346	O-Ring	98339	
RV Diaphragm (BRZ)	63505	63345	O-Ring	98341	
O-Ring	98318	19110	O-Ring	98342	
O-Ring	98319	98354	O-Ring	98343	
O-Ring	98335(2)	98350(2)	Complete Parts Kit	63850	
Complete Parts Kit (CI)	63350	63354			
Complete Parts Kit (Brz)	63343	63344		<b>10" COLD WATER</b>	
	<b>4" COLD WATER</b>	<b>4" HOT WATER</b>			
RV Disc	60237(2)	60237(2)	RV Disc	63835(2)	
Diaphragm Plate Gasket	60239	60239	RV Gasket	63837	
RV Housing Gasket	60644	60644	MV & CV Disc	63910(2)	
MV & CV Disc	62335(2)	62335(2)	MV & CV Cover Gasket	63904(2)	
MV & CV Cover Gasket	63404(2)	63404(2)	RV Diaphragm	61479	
RV Diaphragm (CI)	63305	63346	O-Ring	98339	
RV Diaphragm (Brz)	63505	63345	O-Ring	98340	
O-Ring	98318	19110	O-Ring	98341	
O-Ring	98319	98354	O-Ring	98342	
O-Ring	98336(2)	98351(2)	Complete Parts Kit	63950	
Complete Parts Kit (CI)	63450	63454			
Complete Parts Kit (Brz)	63443	63444			

## MODEL 6CM BODIES

DESCRIPTION	CAST IRON PART NO.	BRONZE PART NO.
2½" Body	63526	63501
3" Body	63301	63326
4" Body	63401	63426
6" Body	63601	63626
8" Body	63801	—
10" Body	63901	—

If more than one part is required per assembly, quantity is indicated in parentheses after part number.

US. NO.	DESCRIPTION	3" PART NO.	4" PART NO.	6" PART NO.
	Cover Bolt	90129(8)	90168(14)	90292(16)
	Cover Nut	90151(8)	90151(14)	90251(16)
	Cover	63302	63402	63602
	Cover Gasket	63304	63404	63604
	Spring Retainer Nut	90260	90336	90336
	Spring Retainer	63309	63409	63609
	Spring	61388	62304	61485
	Disc Holder	61832	61852	61892
	Disc	62334	62335	63605
	Guide	63311	63411	63611
	Guide Cap Screw	90282	90282	90382
	Seat	63306	63406	63606
	O-Ring	98335	98336	98337
	Complete Valve Assembly	63313	63413	63613

ILLUS. NO.	DESCRIPTION	8" PART NO.	10" PART NO.
	Cover Bolt	90141(14)	90360(2)
	Cover Bolt	90140(2)	90371(16)
	Cover Nut	90358(14)	90372(16)
	Cover	63802	63902
	Cover Gasket	63804	63904
1	Spring Retainer Nut	90336	90373
1A	Eyebolt	90198	90199
2	Spring Retainer	63809	63909
3	Spring	63808	63908
3A	Stem	63852	62238
4	Disc Holder	61275	62235
5	Disc	63810	63910
6	Guide	61754	62236
7	Guide Washer	63820	63820
8	Lockwasher	90337	90337
9	Guide Cap Screw	90381	90381
10	Seat	63806	63906
11	O-Ring	98343	98340
1-11	Complete Valve Assembly	63813	63913

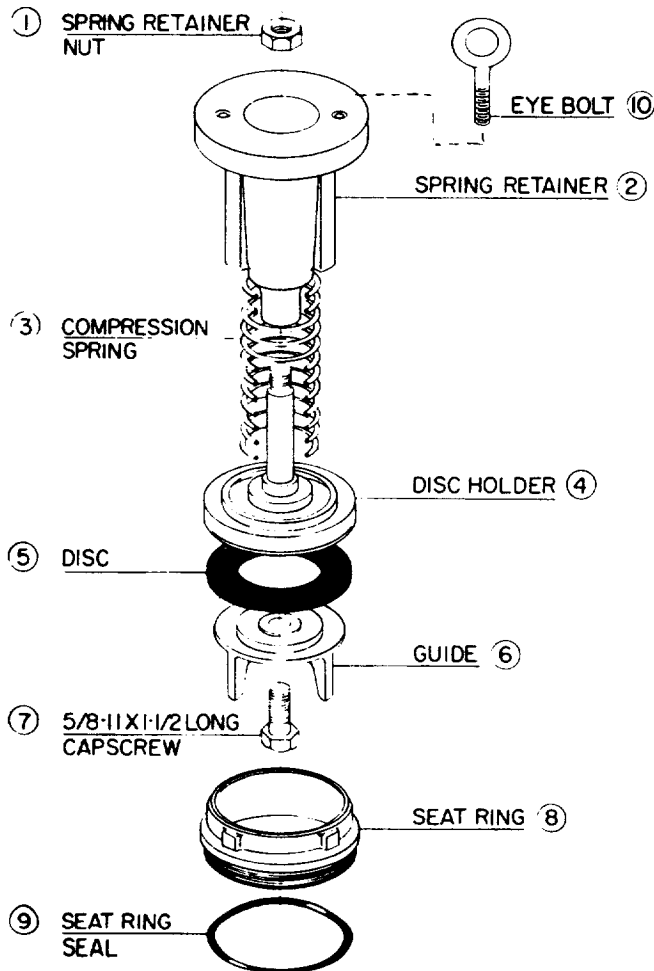


FIGURE 22  
CHECK VALVE ASSEMBLY  
2 1/2" - 6" HERSEY NO. 2

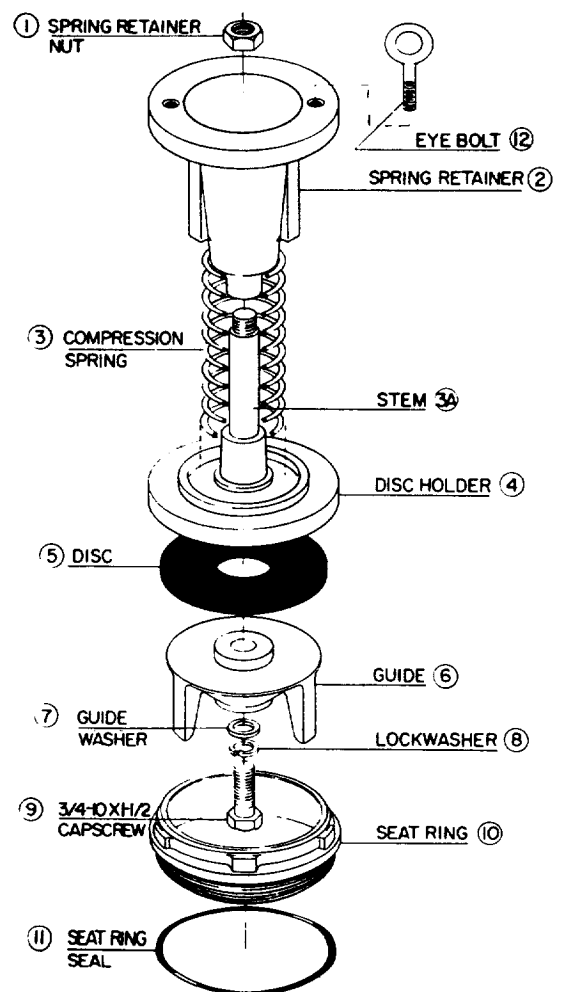


FIGURE 23  
CHECK VALVE ASSEMBLY  
8" - 10" HERSEY NO. 2

# HERSEY NO. 2 CHECK VALVE ASSEMBLY

If more than one part is required per unit, quantity is indicated in parenthesis after part number.

## FITTINGS

DESCRIPTION	PART NO.
<b>SIZE 3"</b>	
Space Nipple (first testcock)	96263
Testcock	96443(3)
Coupling (first testcock)	96027
<b>SIZE 4"</b>	
Space Nipple (first testcock)	96263
Testcock	96443(3)
Coupling (first testcock)	96027
<b>SIZE 6"</b>	
Testcock	96444(3)
<b>SIZE 8"</b>	
Testcock	96444(3)
<b>SIZE 10"</b>	
Testcock	96444(3)
3", 4" Inlet Gate Valve	
Testcock	96443
Space Nipple	96263
Coupling	96027
6", 8", 10" Inlet Gate Valve	
Testcock	96444
Space Nipple	96060
Coupling	96147

## RUBBER PARTS KITS

DESCRIPTION	PART NO.
<b>SIZE: 3"</b>	
Rubber Parts Kits Complete	63351
CV Disc	62334(2)
CV Cover Gasket	63304(2)
CV O-Ring	98335(2)
<b>SIZE: 4"</b>	
Rubber Parts Kits Complete	63451
CV Disc	62335(2)
CV Cover Gasket	63404(2)
CV O-Ring	98336(2)
<b>SIZE: 6"</b>	
Rubber Parts Kits Complete	63651
CV Disc	63605(2)
CV Cover Gasket	63604(2)
CV O-Ring	98337(2)
<b>SIZE: 8"</b>	
Rubber Parts Kits Complete	63851
CV Disc	63810(2)
CV Cover Gasket	63804(2)
CV O-Ring	98343(2)
<b>SIZE: 10"</b>	
Rubber Parts Kits Complete	63951
CV Disc	63910(2)
CV Cover Gasket	63904(2)
CV O-Ring	98340(2)

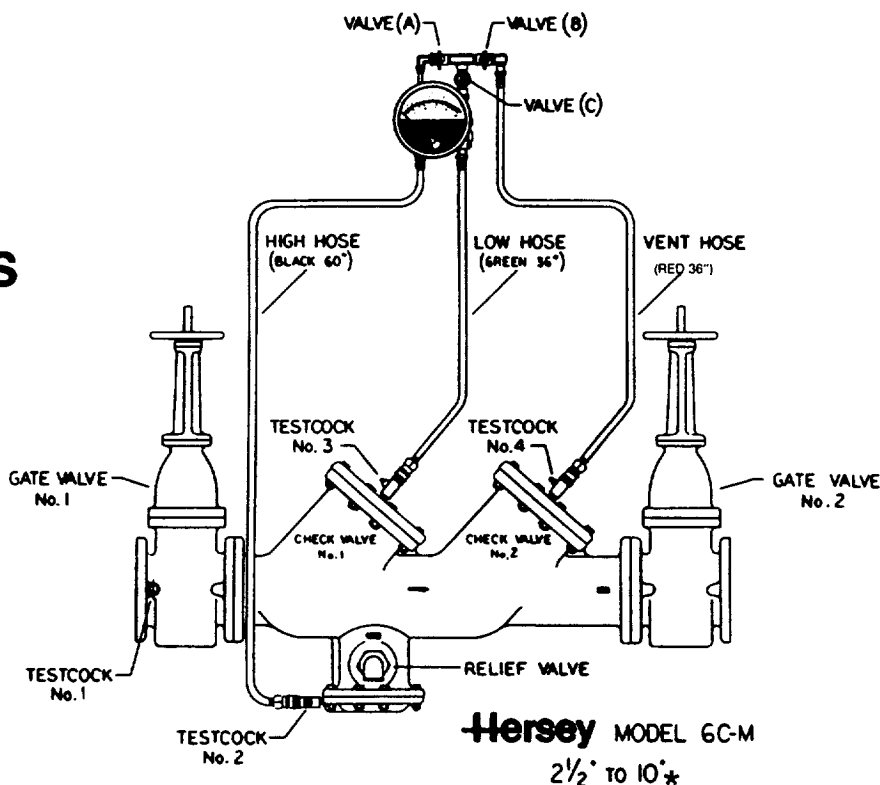
## HERSEY NO. 2 BODIES

SIZE	PART NO.
3"	63318
4"	63418
6"	63618
8"	63818
10"	63918

### REDUCED PRESSURE BACKFLOW PREVENTERS

#### ASSEMBLY OF TEST KIT TO BACKFLOW PREVENTER

1. Close valves (A), (B) and (C) on test kit.
2. Connect HIGH pressure hose (black) to testcock No. 2 on the device.
3. Connect LOW pressure hose (green) to testcock No. 3.
4. Close gate valve No. 2.
5. Open testcocks No. 2 and No. 3.
6. Open vent valve (B).
7. Open high pressure (A) and low pressure (C) valves until all air is expelled.
8. Close (A), (B) and (C) valves.
9. Connect VENT hose (red) to testcock No. 4 on the device.



#### TEST PROCEDURES

To determine the static pressure drop across the first check valve. Requirement: the first check valve shall maintain a static pressure drop of at least 5 PSI.

1. Testcocks No. 2 and No. 3 must be open.
2. Crack open gate valve No. 2 to re-establish pressure conditions in the device.
3. Close gate valve No. 2 and note the differential pressure on the gauge. A reading of 5-8 PSI is normal.

B. To test the second check valve for tightness against reverse flow. Requirement: the second check valve must be tight against reverse flows under all pressure differentials.

1. Slowly open HIGH valve (A) and VENT valve (B). Keep LOW valve (C) closed.
2. Open testcock No. 4.
3. The differential pressure reading on the gauge will drop slightly and then remain steady. If the gauge reading continues to drop (until the relief valve discharges), it indicates that the second check valve is leaking.

C. To test gate valve No. 2 for tightness. After passing Test B, continue the test by closing testcock No. 2. The indicated pressure will decrease slightly. If the pressure differential continues to decrease (approaching zero), the No. 2 gate valve is reported to be leaking.

NOTE: If gate valve No. 2 is leaking, the Test A is invalid. An indication of leakage in Test B could be either check valve No. 1 or check valve No. 2. If no indication of leakage in Test B, then both check valves are tight.

D. To test operation of the differential pressure relief valve. Requirement: the differential pressure relief valve must operate to maintain the zone between the two check valves at least 2 PSI less than the supply pressure.

1. Valves (A), (B) and (C), and testcock No. 4 must be closed. Testcocks No. 2 and No. 3 must be open.
2. Open HIGH valve (A).
3. Very slowly open LOW valve (C) until the differential gauge needle starts to drop. Note the pressure reading when the relief valve starts to discharge. This gauge reading must be at least 2 PSI.

NOTE: If during test C, gate valve No. 2 is shown to be leaking, also open VENT valve (B) and testcock No. 4 during step #2 of Test D. This extra step uses supply pressure to seat check valve No. 2 and allows testing of the relief valve.

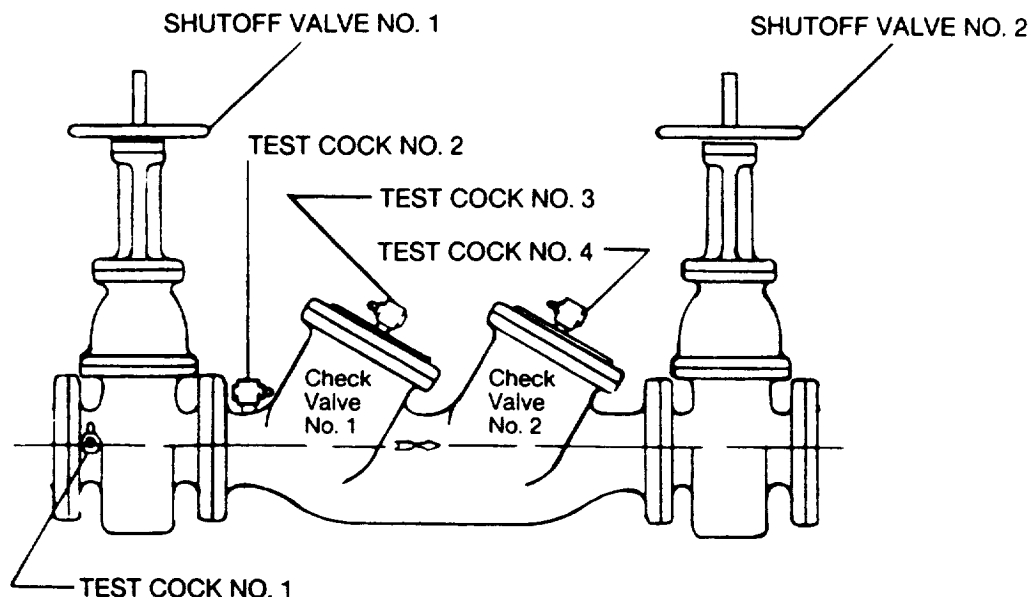
#### TEST CONCLUSION

1. Close all testcocks.
2. Disconnect VENT hose from testcock No. 4.
3. Open valves (A), (B) and (C) to drain water pressure from the test gauge.
4. Remove hoses from testcocks No. 2 and No. 3 and drain remaining water in the gauge to prevent freezing.

\*The same test is also used for testing the Hersey/BEECO Model FRPII.

# Hersey No. 2

## DOUBLE CHECK VALVE ASSEMBLY SIZES 3", 4", 6", 8" & 10"\*



### TEST PROCEDURE Double Check Valves

#### TESTING OF CHECK VALVE NO. 1

1. Close No. 1 and No. 2 gate valves.
2. Open testcocks Nos. 2, 3 and 4. Confirm that gate valve No. 1 is holding tight by observing that the discharge of water from testcock No. 2 stops.
3. Attach test kit VENT hose (red) to testcock No. 1, LOW hose (green) to testcock No. 2, and HIGH hose (black) to testcock No. 3. Open valves (A) and (B). Close valve (C).
4. Close testcock No. 4
5. Open testcock No. 1. The needle on the gauge will indicate a pressure in excess of 15 PSI.
6. Slowly open valve (C) until the gauge reads approximately 10 PSI. Close valve (C). The gauge reading will not change if check valve No. 1 is holding tight. If No. 1 check valve is leaking the gauge reading, will drop to 0.

#### TESTING OF CHECK VALVE NO. 2

1. Close testcock No. 1.
2. Open testcock No. 4.
3. Change LOW hose from testcock No. 2 to testcock No. 3. Change HIGH hose from testcock No. 3 to testcock No. 4. Open valves (A) and (B). Close valve (C).
4. Open testcock No. 1. The needle on the gauge will indicate a pressure in excess of 15 PSI.
5. Slowly open valve (C) until the gauge reads approximately 10 PSI. Close valve (C). The gauge reading will not change if check valve No. 2 is holding tight. If check valve No. 2 is leaking, the gauge will drop to 0.

NOTE: Minor leakage in gate valve No. 2 will not affect the test results of check valve No. 2. However, a leaking gate valve No. 1 will cause a good check valve No. 1 to fail the test.

\*The same test method is also used for testing the Hersey/BEECO Model FDC and HDC.



**TEST PROCEDURES — HERSEY NO. 2  
DOUBLE CHECK VALVE ASSEMBLY  
ALTERNATIVE TWO-GAUGE METHOD**

(SEE FIGURE 25)

**TEST NO. 1**

**Purpose:**

To test No. 1 check valve for tightness against reverse flow.

**Requirement:**

Valve must be tight against reverse flow under all pressure differentials.

**Steps:**

1. Close shutoff valve No. 2.
2. Install pressure gauges and control cocks (closed) at test cocks No. 2 and No. 3.
3. Open test cocks No. 2 and 3. Close No. 1 shut off valve.
4. Drain *slowly* from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. Close control cock. If both gauges hold the established differential pressure for at least one minute, the check shall be noted in the report as "Closed Tight".  
If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 2 in the attempt to establish the one-pound differential. Confirm by the following procedure:
  - a. Open shutoff valve No. 1 and re-establish pressure in the device.
  - b. Install bypass hose between No. 1 and No. 3 test cocks, thus feeding line pressure downstream of check valve.
  - c. Close shutoff valve No. 1 Drain slowly from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. If water runs continuously from control cock, the check shall be noted as "Leaked".

**TEST NO. 2**

**Purpose:**

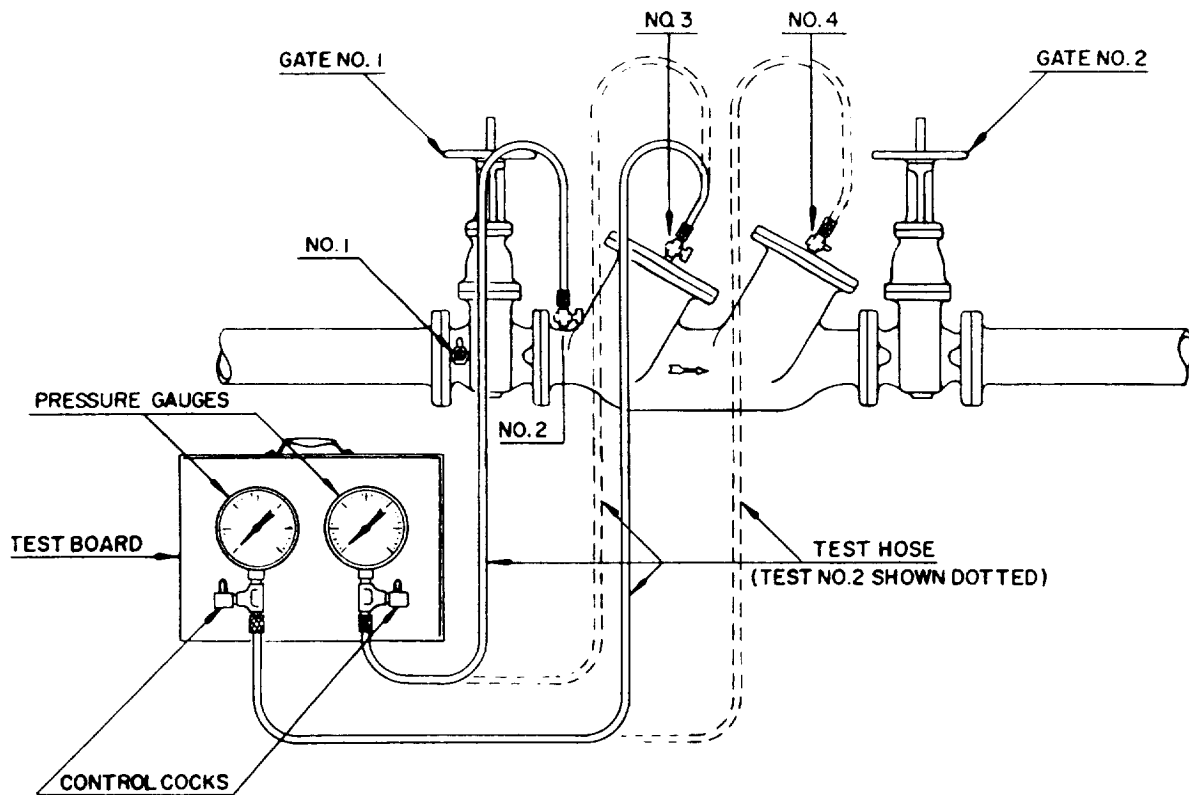
To test No. 2 check valve for tightness against reverse flow.

**Requirement:**

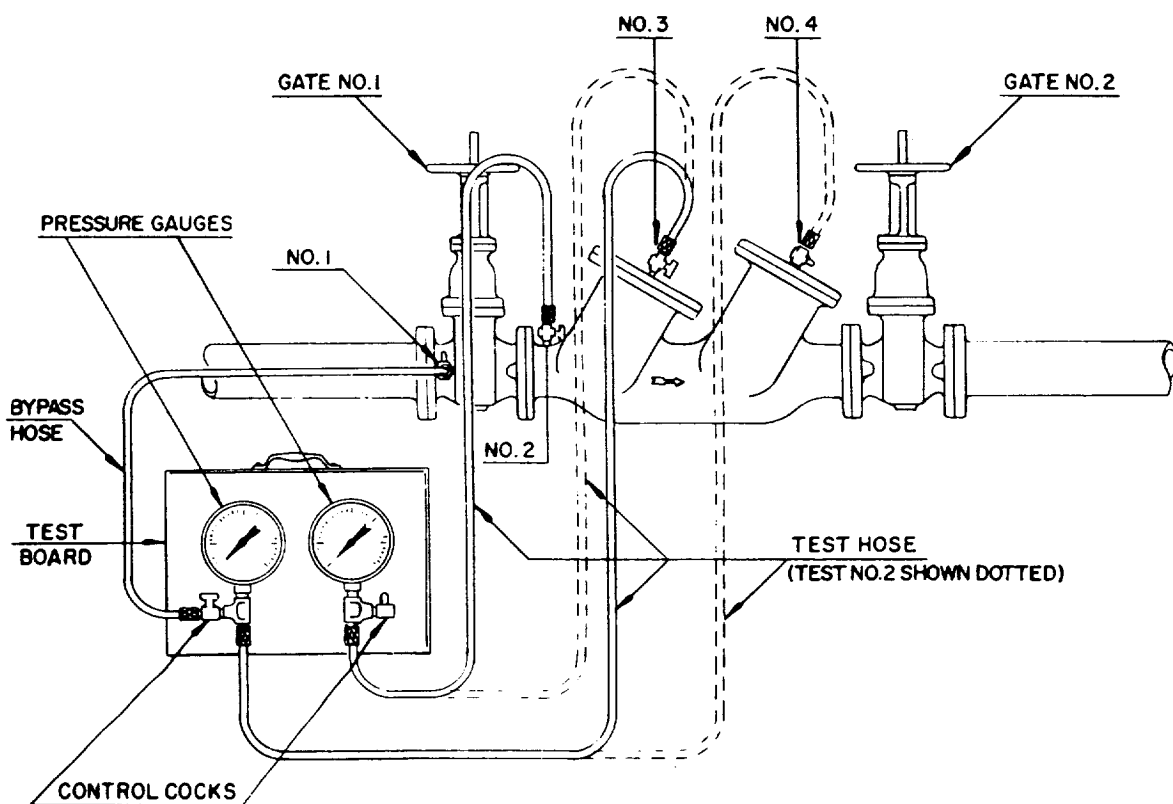
Valve must be tight against reverse flow under all pressure differentials.

**Steps:**

1. Open No. 1 shutoff valve and re-establish pressure in the device.
2. Install pressure gauges and control cocks at test cocks No. 3 and No. 4.
3. Open test cocks No. 3 and 4. Close No. 1 shutoff valve.
4. Drain *slowly* from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. Close control cock. If both gauges hold the established differential for at least one minute the check shall be noted as "Closed Tight."  
If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 3 in the attempt to establish the one-pound differential. Confirm by the following procedure:
  - a. Open No. 1 shutoff valve and re-establish pressure in the device.
  - b. Install bypass hose between No. 1 and No. 4 test cocks, thus feeding line pressure downstream of check valve.
  - c. Close No. 1 shutoff valve. Drain slowly from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. If water runs continuously from control cock, the check shall be noted as "Leaked".
  - d. Remove all equipment and return shut-off valves to original setting.



TESTS NO. 1 AND 2 — "STEP B"



TESTS NO. 1 AND 2 — "STEP F"

FIGURE 25  
PRESSURE GAUGES INSTALLED ON HERSEY NO. 2  
DOUBLE CHECK VALVE ASSEMBLY

## TEST EQUIPMENT FOR HERSEY MODEL NO. 2

Recommended test equipment is outlined below. The test equipment illustrated consists of the following:

Qty.	Description
2 -	Pressure gauges, of good quality — 2" dial or larger, 0-150 psi range.
3 -	6-ft lengths rubber hose with 1/4" water tight screw couplings. (1/4" i.d. welding hose is suggested).
2 -	1/4" level handle brass gauge cocks, double female.
2 -	1/4" standard brass tees
2 -	1/4" brass close nipples
6 -	1/4" I.P. thread to welding hose thread brass couplings (sometimes called regulator outlet fittings).
	3/8" plywood board for mounting gauges.
3 -	1/4" x 1/2" bushings (for use in testing 3" and 4" check valve assemblies)
3 -	1/4" x 3/4" bushings (for use in testing 6", 8" and 10" devices)

In testing 3" and 4" check valve assemblies, install 1/4" x 1/2" bushings in test cocks No. 1, 3, and 4. In testing 6", 8" and 10" assemblies, install 1/4" x 3/4" bushings in testcocks.

### MODEL 6CM RELIEF VALVE AIR GAP DRAIN FITTING

This fitting has been designed to permit direct connection of the relief valve drain piping to the backflow preventer. It provides an air gap below the outlet of the relief valve; and includes an internally-threaded opening at its base.

Two sizes are provided: one for installation on 2½"-6" devices; and the second for installation on 8" and 10" devices. The internal thread size is 2"-11½ NPT on the funnel for 2½"-6" devices; and 4"-8 NPT on the funnel for 8" and 10" devices. Both fittings are available as kits which include the fitting and two connection bolts.

## INSTALLATION (see fig. 3)

Insert bolts in drain funnel. Position funnel so that bolts can be tightened against opposite sides of relief valve outlet elbow, resting on rim, and parallel to side of device. Tighten bolts firmly. Thread drain piping to fitting, using commercially-available pipe sealant.

### RELIEF VALVE AIR GAP FUNNEL KITS

SIZE	PART NO.
(2½" - 6")	63358
(8", 10")	63858

### PACKAGING AND INSTALLATION OF TEST COCKS AND FITTINGS

#### PACKAGING

Three test cocks are provided for each device plus one for the inlet gate valve. On 2½", 3" and 4" devices, a space nipple and coupling are also provided for the inlet gate valve. Sealing tape is factory-installed on test cocks and 2½"-4" space nipple.

For 2½" devices and for 3" devices equipped with gate valves, test cocks and fittings are packaged in a carton attached to the pallet. For 4"-10" devices (and with 3" devices *not* equipped with gate valves) the bag is placed inside the protective cover on the inlet gate valve or flange of the device.

#### INSTALLATION

Remove plastic protective caps from the four test cock openings (three on the device and one on the inlet shut off valve).

Install test cocks. On 2½", 3" and 4" inlet gate valve, install space nipple, coupling and test cock in that order. Slotted operating boss should have slot at right angles to test cock opening (closed position). *Test cocks must be closed prior to operation of the device.*

INFORMATION FOR REPAIR OF THESE DEVICES ONLY !!!  
ANY TOOLS OR METAL PARTS ARE NO LONGER AVAILABLE  
RUBBER PARTS & PARTS KITS HOWEVER ARE STILL AVAILABLE.

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# Hersey

## BACKFLOW PREVENTER MAINTENANCE MANUAL

BEECO REDUCED PRESSURE PRINCIPLE  
BACKFLOW PREVENTERS  
MODELS 6,6C,10 AND 12

●  
BEECO AND HERSEY  
DOUBLE CHECK VALVE ASSEMBLIES  
MODELS VC AND NO. 1

---

BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

**OPERATION AND INSTALLATION**

**(Beeco Reduced Pressure Principle Backflow Preventers)**

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## OPERATION AND INSTALLATION INSTRUCTIONS

### BEECO REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS

#### DESCRIPTION (see Fig. 1)

The BEECO Reduced Pressure Principle Backflow Preventer operates on the principle that water will not flow from a zone of lower pressure to one of higher pressure. It provides protection against backflow caused by both backpressure and backsiphonage.

The device consists of two spring-loaded check valves (A and B) and a spring-loaded, diaphragm-actuated differential pressure relief valve (C) located in the zone between the check valves.

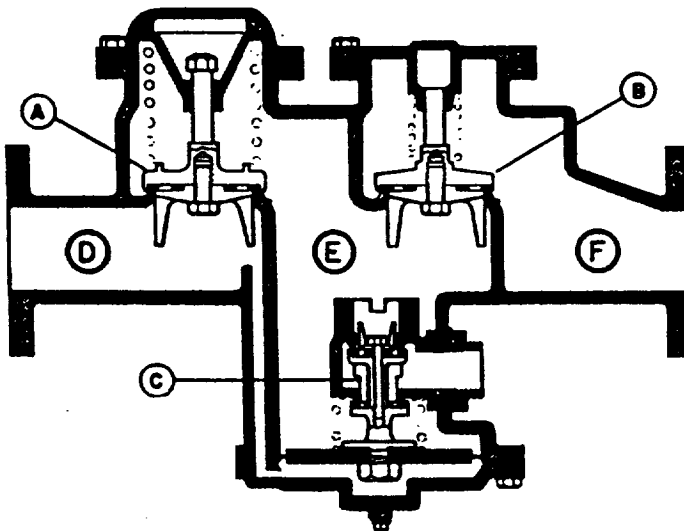


FIGURE 1  
3" MODEL 6C BEECO DEVICE ILLUSTRATED

#### NORMAL OPERATION

The first check valve (A) causes all water passing through it to be automatically reduced in pressure by approximately 8 psi.

The second check valve (B) is lightly spring-loaded and forms the "double check" feature of the device. It acts to prevent unnecessary drainage of the domestic system in case a backflow condition occurs.

The relief valve (C) is spring-loaded to remain open, and diaphragm actuated to close by means of differential pressure.

To illustrate the operation, assume water, having a supply pressure of 60 psi, is flowing in a normal direction through the device. If all valves beyond area F are closed, creating a static condition, the water pressure in area D will be 60 psi and water pressure between the check valves (E) will be 52 psi.

The inlet pressure of 60 psi is transmitted through a cored passageway to the underside of the diaphragm of the relief valve (C). This valve is spring-loaded to remain in an open position until the differential pressure amounts to approximately 4 psi across the relief valve.

During normal operation, therefore, the 8 psi differential pressure produced by the first check valve (A) exceeds the spring-loading of the relief valve (C) and causes the relief valve (C) to remain closed.

#### BACKFLOW

There are two conditions that tend to produce backflow:

**Backsiphonage** — where the pressure in the drinking water system becomes less than atmospheric due to a vacuum or partial vacuum in that system.

**Backpressure** — where the pressure in the non-potable system exceeds that in the drinking water system.

#### BACKSIPHONAGE

As the supply pressure drops in area D, it also drops in the area below the diaphragm of the relief valve (C). When the pressure differential across the diaphragm decreases to approximately 4 psi, the relief valve (C) will start to open. This happens because the spring above the diaphragm of the relief valve (C), which is trying to force the valve open, is designed to compress with a differential pressure of 8 psi. When that differential is decreased to 4 psi, the spring will extend and cause the relief valve (C) to start to open.

This spring-loaded relief valve is designed to eliminate intermittent discharges and "spitting" with normal minor fluctuations in the line pressure.

As the supply pressure continues to drop, the relief valve (C) automatically continues to drop, the relief valve (C) automatically continues to drain and, regardless of the pressure on the supply side, approximately 4 psi less pressure will be maintained between the check valves (zone E). This will cause continual drainage which will be readily visible at the drain outlet.

## BACKPRESSURE

Assume that pressure at the discharge side (F) increases to 80 psi, while the supply pressure (D) remains at 60 psi:

1. If the second check valve (B) does not leak, water under higher pressure in area F will not enter the area between the check valves (zone E), and the pressure in this zone will remain at 52 psi. Under these conditions, the relief valve (C) will remain closed since the 8 psi differential pressure is still being maintained between the supply pressure (area D) and the area of reduced pressure between the check valves (zone E).

2. If the second check valve (B) does leak, water under high pressure (area F) will flow into zone E. If the pressure in this zone increases to approximately 56 psi – still 4 psi lower than the supply pressure (area D) – the relief valve will start to open and discharge this reversely flowing water to atmosphere, maintaining the pressure in zone E approximately 4 psi lower than supply pressure. The relief valve will automatically continue to drain as long as this backflow condition exists and as long as the second check valve (B) is leaking.

If for any reason the first check valve (A) should leak during a shutoff beyond area F, the water under higher pressure in area D will leak into zone E. This will cause the relief valve to open as previously described and, again, provide visual indication at the drain outlet.

In the unlikely event that the relief valve diaphragm should rupture, an unbalanced condition between area D and zone E will occur, and the relief valve will immediately discharge to atmosphere.

## INSTALLATION – GENERAL COMMENTS

### A. WARM CLIMATE ABOVE GROUND INSTALLATION (Fig. 2)

Reduced pressure backflow preventers should be installed only where there is adequate drainage. At no time should they be placed where any part of the unit could be submerged in standing water.

The most satisfactory installation is above ground. This type of installation is recommended wherever practical. Support should be provided for the larger sizes (3" and up). A concrete slab under the unit is sometimes desirable.

Normally, any discharge from the relief valve is spilled onto the ground through the drain elbow. Drainage may be piped away from the location, in which case an air gap should be used between the relief valve port elbow and the drain line.

### B. COLD CLIMATE INDOOR INSTALLATION (Fig. 3)

In climates where freezing conditions are likely or where it is impractical to install the backflow preventer above ground, the installation should be made in an easily accessible location inside a building.

The unit should be placed above the floor at a distance great enough to allow clearance for repair work. If the backflow preventer is positioned against a wall, care should be taken to be sure that the four test cocks are easily accessible. Proper drainage should be provided for the relief valve. An air gap should be used between the relief valve outlet and the drain line if drainage is to be piped away.

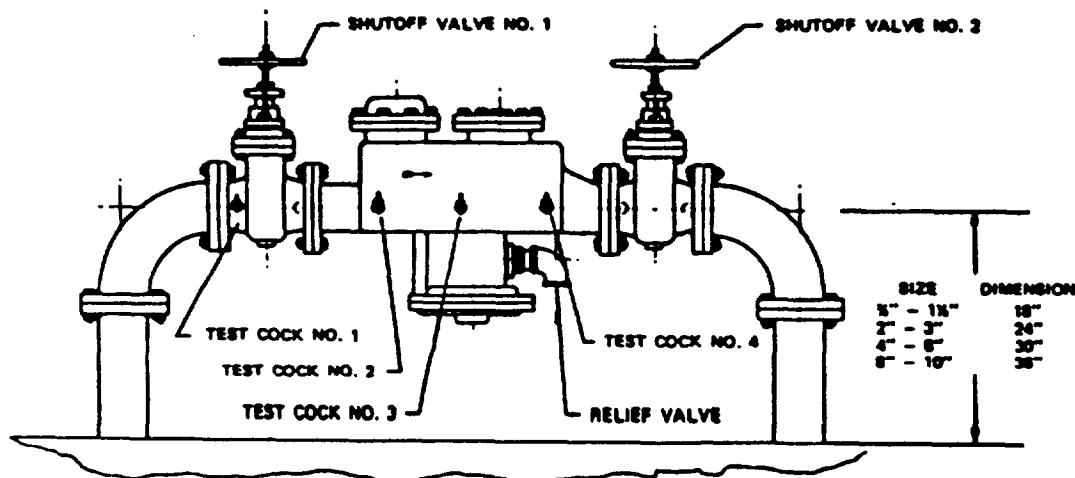


FIGURE 2  
ABOVE GROUND INSTALLATION

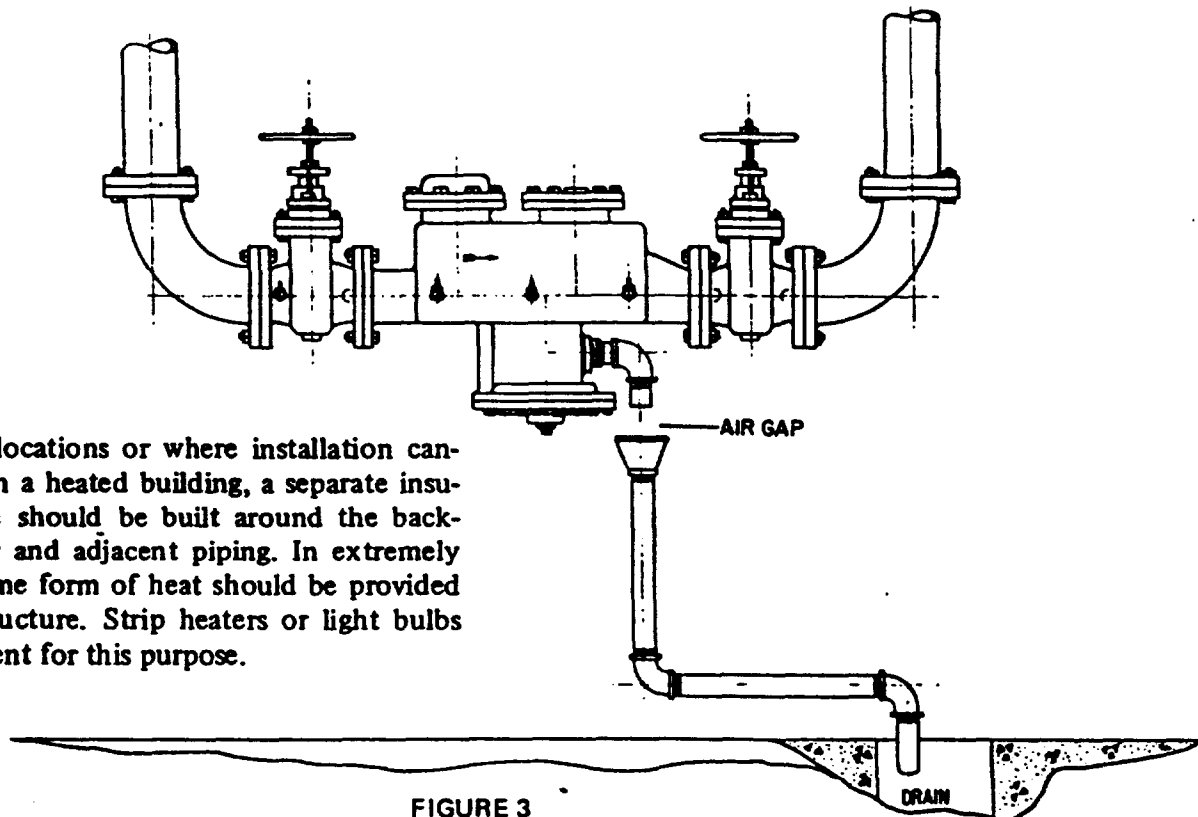


FIGURE 3  
INDOOR INSTALLATION

In remote locations or where installation cannot be made in a heated building, a separate insulated structure should be built around the backflow preventer and adjacent piping. In extremely cold areas, some form of heat should be provided within the structure. Strip heaters or light bulbs may be sufficient for this purpose.

#### C. MODIFIED PIT INSTALLATION (Fig. 4)

Unless absolutely necessary, it is strongly recommended that backflow preventers *not* be placed in pits. In the event installation must be made in a pit, the modified pit type installation (Fig. 4) is preferable. The relief valve drain should be piped to the outside of the vault and discharged no less than 12" above the grade line.

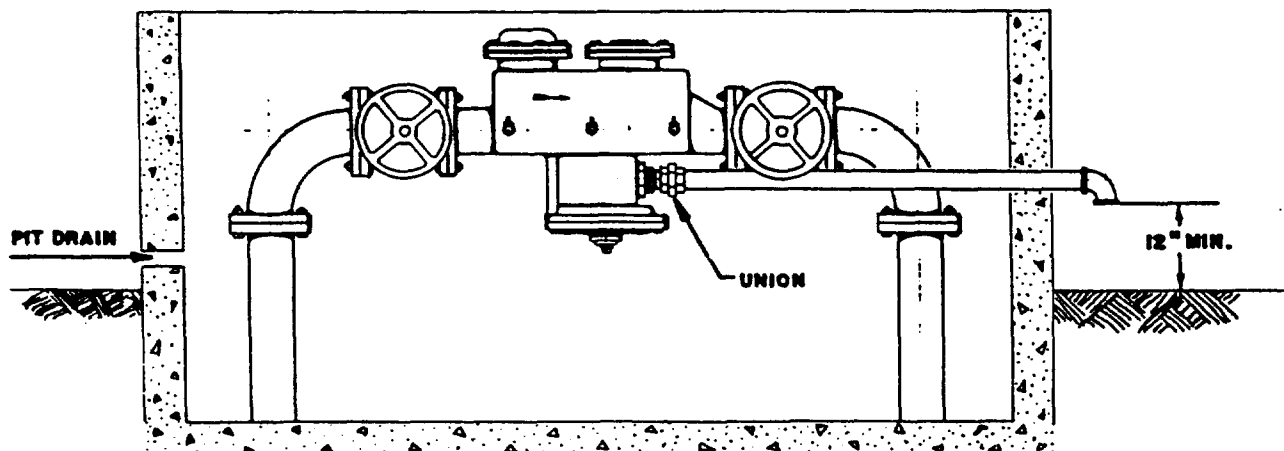


FIGURE 4  
MODIFIED PIT INSTALLATION



# BEECO REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS

## INSTALLATION — SPECIFIC PROCEDURES

### GENERAL INSTRUCTIONS

1. Devices should be installed in an accessible location to facilitate testing and repairs.
2. Devices should be installed in a horizontal position above the ground or floor level as shown in Figure 2.
3. In no case should the relief valve discharge be solidly piped into a sump, sewer, drainage ditch, etc.
4. If not already provided, shut off valves should be installed at each end of the device so that it can be tested and maintained.
5. BEFORE INSTALLING THE DEVICE, PIPELINES SHOULD BE THOROUGHLY FLUSHED TO REMOVE FOREIGN MATERIAL.
6. After installation, *with flow through the device*, continual discharge from the relief valve opening usually indicates that there is foreign material holding the relief valve open. To remove foreign material, flush relief valve as follows:
  - a. Close inlet shutoff valve.
  - b. Open test cock No. 2. Relief valve should fully open and discharge.
  - c. Close test cock No. 2.
  - d. Open inlet shutoff valve.If relief valve continues to leak, repeat procedure. If flushing does not stop discharge with flow through the device, close shutoff valves, remove and clean the relief valve.
7. After installation, *with no flow through the device* (inlet shutoff valve open, outlet shutoff valve closed) continual discharge from the relief valve indicates a leaking first check valve, probably caused by foreign material under the seat. If flushing (substantial flow through the device) will not clear the device, close shutoff valves, remove and clean the first check valve.
8. Occasional "spitting" or momentary discharge from the relief valve can be expected, if line pressure drops approximately 4 psi, due to operation of flushometers, quick opening valves, or similar devices and valves.

## REPAIR PROCEDURES

### INTRODUCTION

#### A. GENERAL COMMENTS

Usually, it is possible to determine which internal subassemblies require maintenance by observing or testing the backflow preventer. Complete subassemblies, where time is limited, may be installed.

#### B. RUBBER PARTS

Check valve discs are made of soft neoprene; relief valve discs of a harder, or less resilient, neoprene. Two thicknesses of neoprene — coated duck are used for the relief valve diaphragm (except for the 3/4" Model 12 which has a single thickness). Rubber parts should be replaced every five years, or sooner if necessary. These include two check valve discs, two relief valve discs, one or two cover plate gaskets (on models equipped with cover plates), relief valve housing gasket, clamp bolt gasket (1" — 6" sizes), upper and lower seat gaskets (8" and 10" sizes) and relief valve diaphragm (set of 2 except 1 on 3/4" Model 12).

#### C. SPRINGS

Springs rarely require replacement. However, it is advisable to inspect springs for corrosion, pitting or breakage.

#### D. VALVE SEATS

Check valve and relief valve seats should be smooth and clean. The rubber valve discs will seal properly on seats with minor imperfections. If seats are worn considerably, pitted or corroded, they should be replaced or refaced.

#### E. OTHER WORKING PARTS

Inspect disc holders, spacers, and valve guides for evidence of excessive wear or corrosion. Replace worn or corroded parts.

## REPAIR PROCEDURE — MODEL 6C

#### A. REPLACEMENT OF MAIN VALVE RUBBER DISC (See Figs. 5, 6, 7, 8, 9).

1. Close inlet and outlet shutoff valves.
2. Open test cocks 2, 3, 4, to release pressure and drain the backflow preventer.
3. Remove cover cap screws or bolts and nuts,

valve cover and cover gasket or guide plug (1" size). Remove spring (1" size) (3). Caution! Valve spring exerts force directly against plug.

4. Remove main valve assembly (Fig. 7).
5. Remove disc cap screw (1" and 1-1/2" sizes) (7B) or stud nut (2" - 10" sizes) (8). This releases the guide (6A) and guide

washer (8" - 10" sizes) (6B) from disc holder (1" - 6") (4A, 4B), or from disc holder assembly (8", 10") (4C). Stem (8" and 10" sizes) (9) can also be replaced, if necessary (see Fig. 8).

6. Replace disc (5) and reassemble valve guide (6A) to disc holder (4A, 4B) or disc holder assembly (4C).

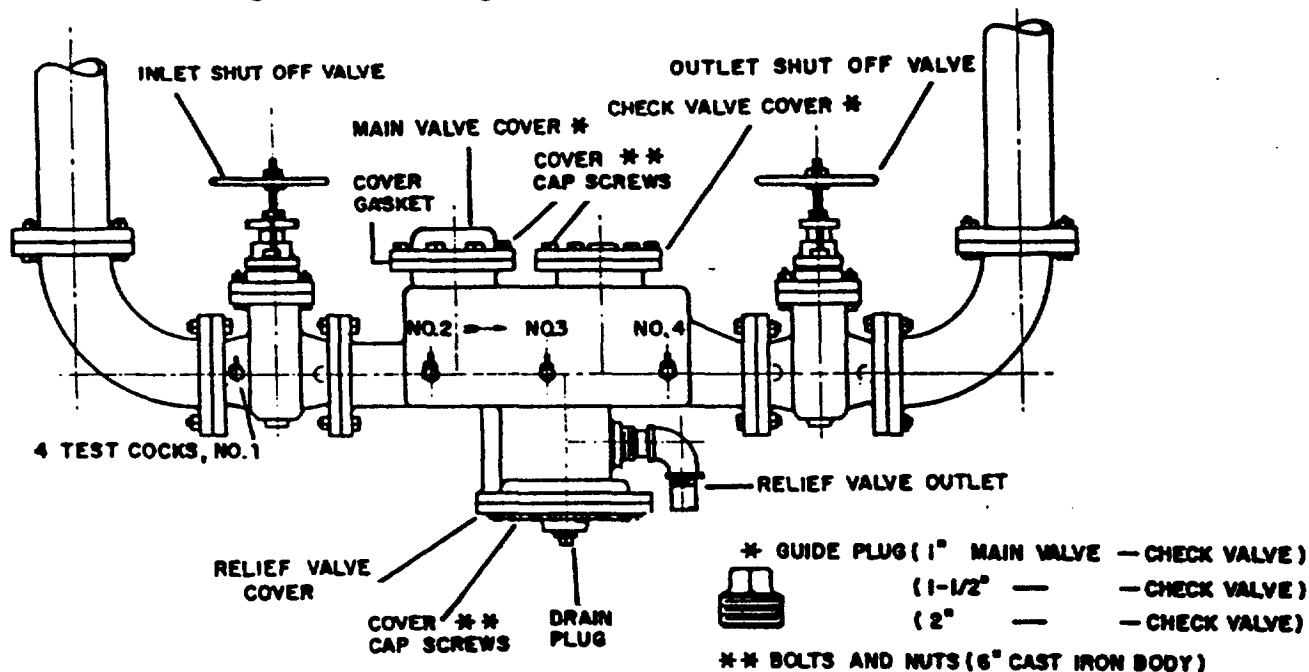


FIGURE 5  
TYPICAL ASSEMBLY (1" - 6" SIZES) - BEECO MODEL 6C DEVICE

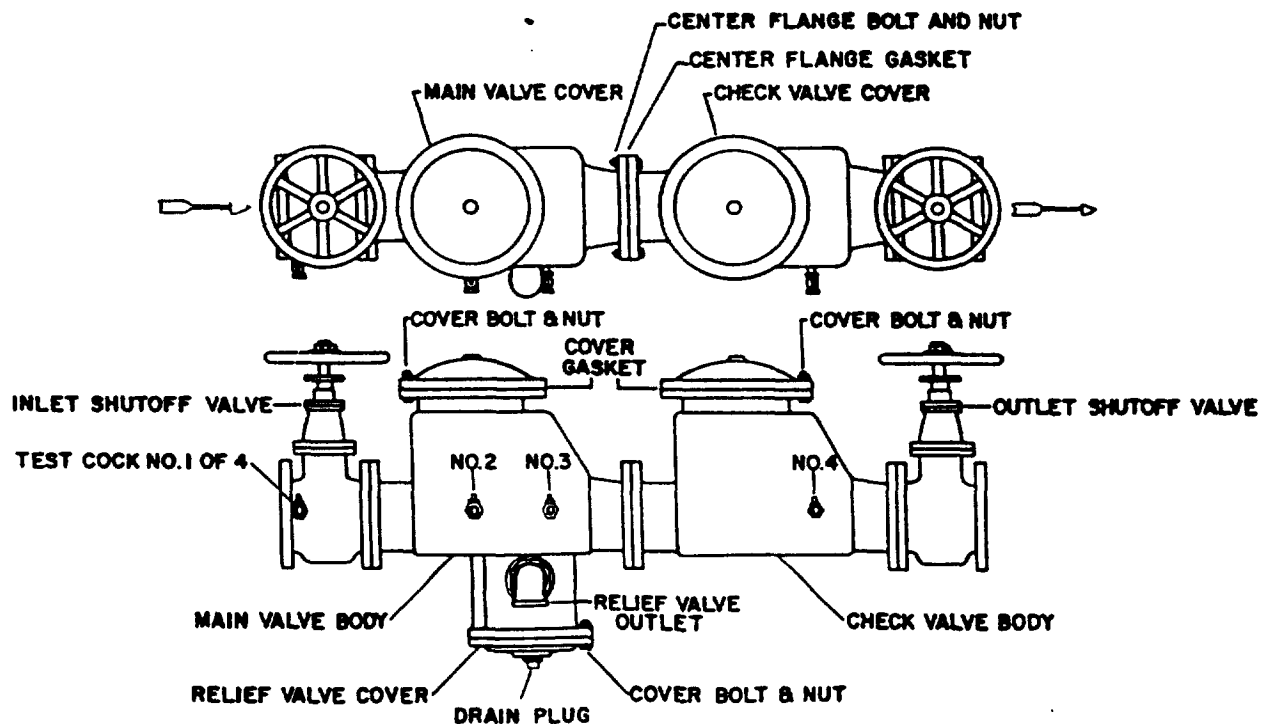


FIGURE 6  
TYPICAL ASSEMBLY (8", 10" SIZES) - BEECO MODEL 6C DEVICE

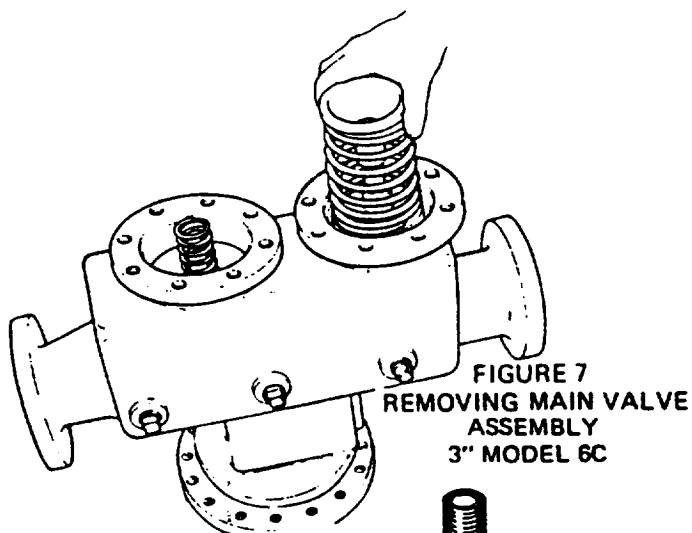


FIGURE 7  
REMOVING MAIN VALVE  
ASSEMBLY  
3" MODEL 6C

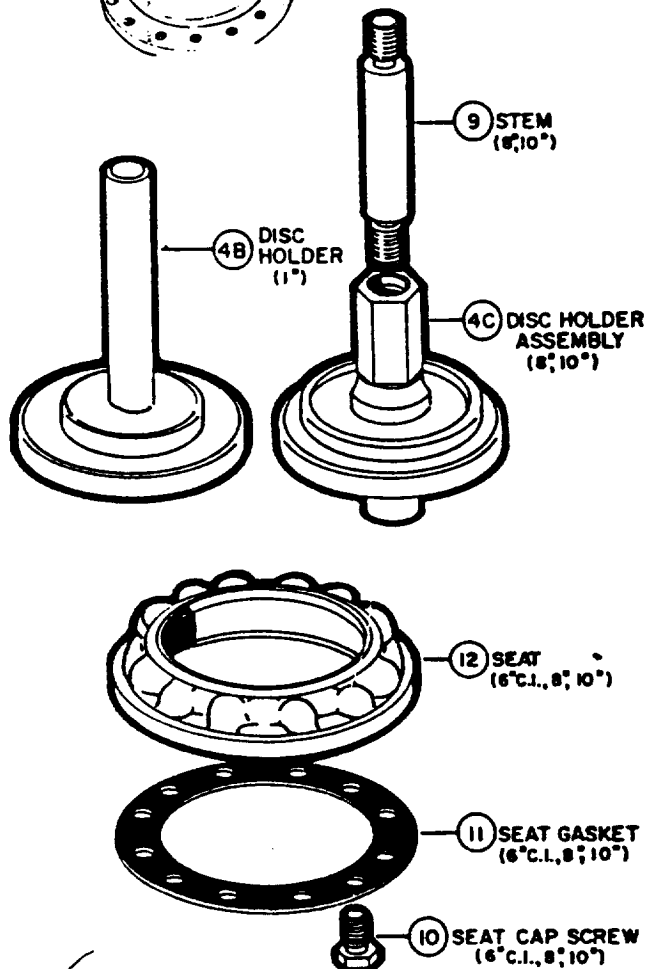


FIGURE 8  
TYPICAL MAIN VALVE ASSEMBLY - BEECO MODEL 6C

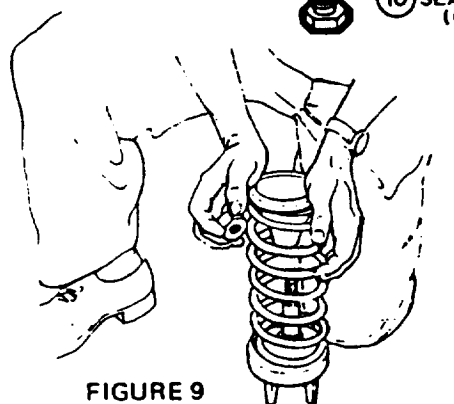


FIGURE 9  
REMOVING MAIN VALVE SPRING  
(1-1/2" - 3" MODEL 6C)

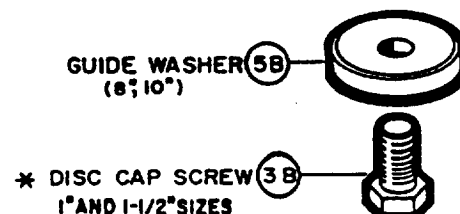
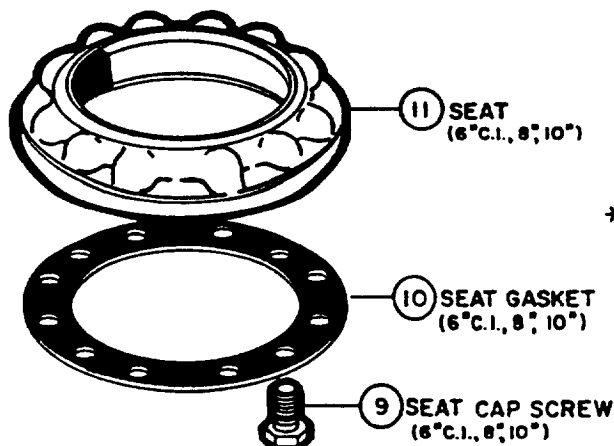
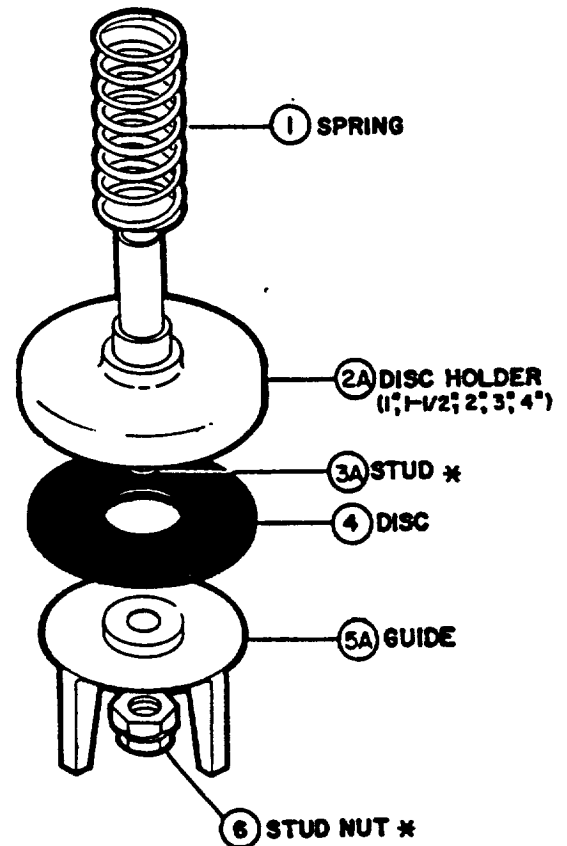
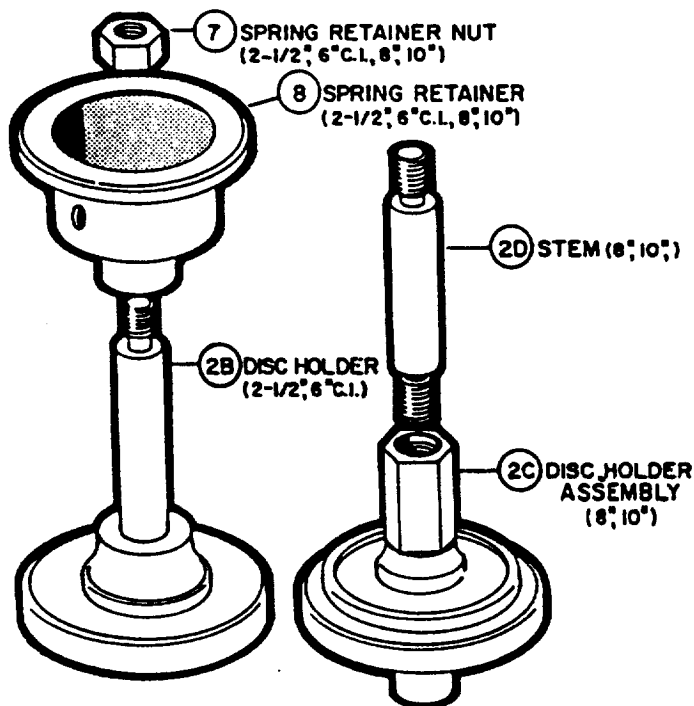
7. To replace seat gasket (6" CI, 8", 10" sizes), remove seat cap screws (10), seat gasket (11), and seat (12). Install new gasket and replace seat and cap screws.
8. Place valve assembly in body.
9. Replace spring (1" size) (3).
10. Replace plug or cover, using new gasket (1-1/2" - 10" sizes).
11. Replace cap screws or bolts and nuts.

**B. REPLACEMENT OF CHECK VALVE RUBBER DISC (and Seat Gasket – 6" CI, 8", 10" sizes) (see Fig. 10).**

1. Remove guide plug (1", 1-1/2", 2" sizes) or cover (2-1/2" – 10" sizes). Caution! Valve spring (1", 1-1/2", 2", 3", 4" and 6" bronze case model) exerts force directly against plug or cover.
2. Remove spring (1) (1", 1-1/2", 2", 3", 4" sizes and 6" bronze case model) and valve assembly, or valve assembly including spring (2-1/2", 6" CI, 8", 10" sizes).
3. Remove disc cap screw (3B) (1", 1-1/2" sizes) or stud nut (6). This releases the

guide (5A) and guide washer (8", 10" sizes) (5B).

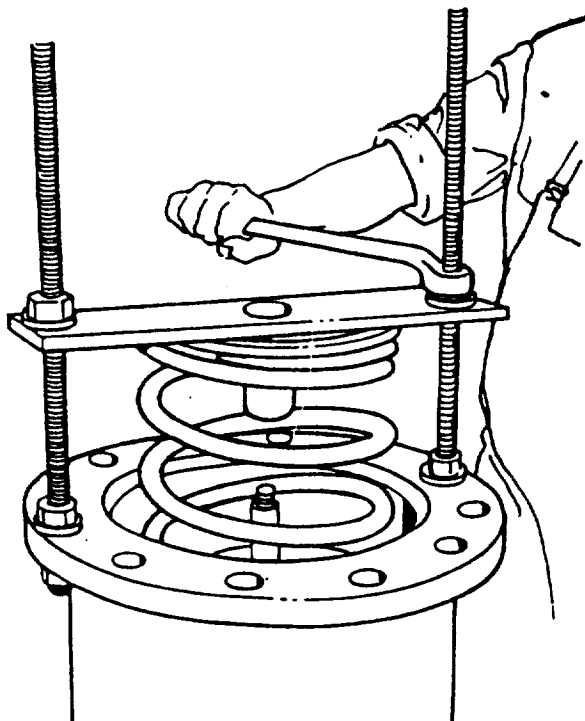
4. Replace disc (4) and reassemble guide to disc holder (2A, 2B, or 2C).
5. To replace seat gasket (6" CI, 8", 10" sizes) remove seat cap screws (9), seat gasket (10), and seat (11). Install new gasket and replace seat and cap screws.
6. Place valve assembly in body. Replace spring (1) if separate from valve assembly.
7. Replace guide plug or cover, using new cover gasket. Replace cap screws or bolts and nuts.



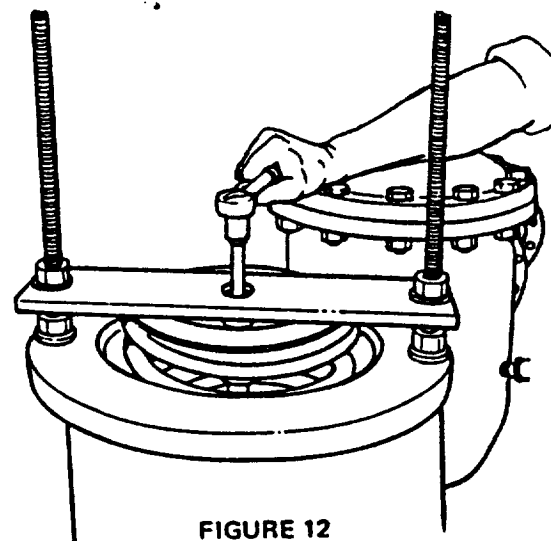
**FIGURE 10  
TYPICAL CHECK VALVE ASSEMBLY  
– BEECO MODEL 6C**

**C. REPLACEMENT OF MAIN VALVE SPRING  
(1-1/2" – 10").**

1. 1-1/2" – 3" (refer to Figs. 8 and 9).
  - a. Loosen spring retainer nut (1).
  - b. Compress spring retainer (2) by hand. Remove spring retainer nut (1).
  - c. Release hand and remove retainer (2) and spring (3).
2. Replacement of Main Valve Spring (4" – 10") (Method optional for 3".)
  - a. Remove cover; leave valve assembly in body.
  - b. Place spring removal plate on main valve spring retainer (refer to chart, Fig. 61 for proper size).
  - c. Attach threaded rods (see chart for proper size) to plate and body flange with nuts provided. On 4" size, screw rod into flange. On 6" – 10" sizes, engage bottom nuts fully. Tighten top nuts against plate.
  - d. Compress spring slightly by tightening top rod nuts. This forces retainer downward to release spring retainer nut.
  - e. Remove spring retainer nut (Fig. 12).
  - f. Gradually loosen top rod nuts to allow spring to relax (Fig. 11).

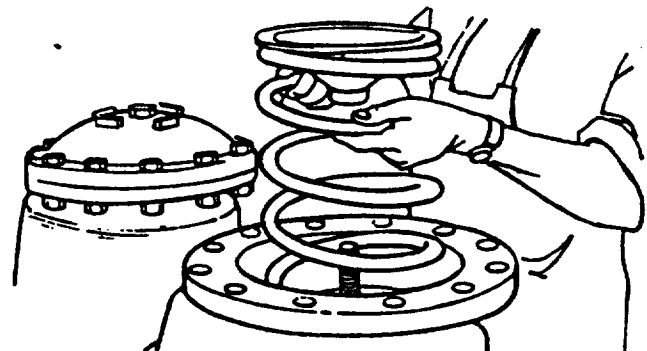


**FIGURE 11  
LOOSENING TOP ROD NUTS TO ALLOW  
8" MAIN VALVE SPRING TO RELAX**

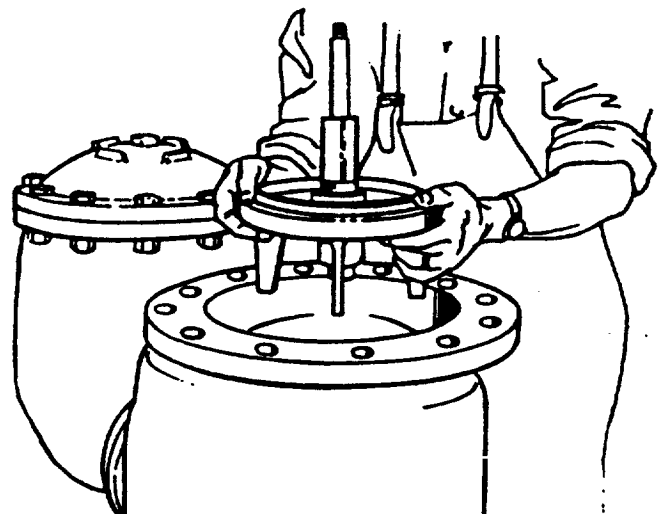


**FIGURE 12  
REMOVING 8" MAIN VALVE SPRING RETAINER  
NUT FOLLOWING INSTALLATION OF SPRING  
REMOVAL PLATE AND THREADED RODS**

- g. Remove plate, spring retainer and spring. Remove remainder of valve assembly (Fig. 13 and 14).



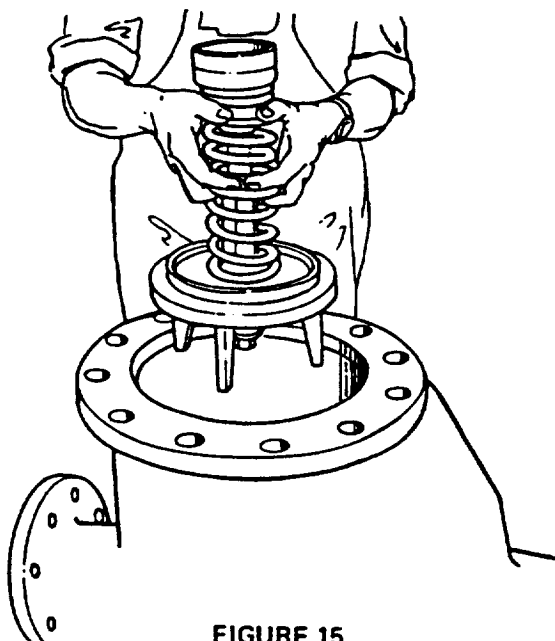
**FIGURE 13  
REMOVAL OF 8" MAIN VALVE SPRING  
RETAINER AND SPRING**



**FIGURE 14  
REMOVING 8" DISC HOLDER ASSEMBLY**

**D. REPLACEMENT OF CHECK VALVE SPRING**  
(2-1/2", 6" CI, 8", 10" sizes) (See Fig. 10.)

1. Remove valve assembly from body (Fig. 15).
2. Loosen spring retainer nut (7).
3. Compress spring retainer (8) by hand. Remove spring retainer nut.
4. Release hand and remove retainer and spring (1).



**FIGURE 15**  
REMOVING 8" CHECK VALVE ASSEMBLY

**E. REPLACEMENT OF CHECK VALVE SPRING**  
(1", 1-1/2", 2", 3", 4", 6" bronze sizes). Spring is released when plug or valve cover is removed.

**NOTE:** In all sizes, the heavier spring is used on the main or first check valve.

**F. REPAIR OF RELIEF VALVES – 1" – 6" SIZES** (see Fig. 16 and 5).

**1. Removal**

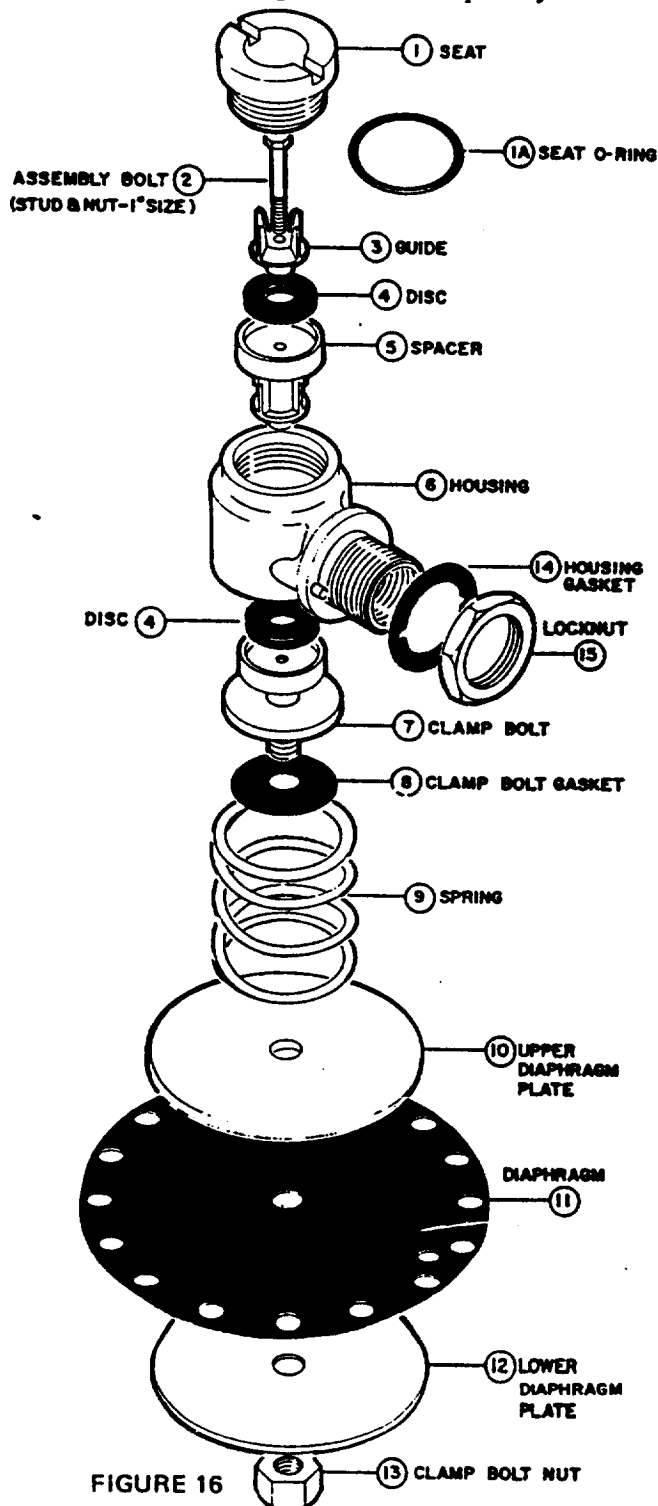
- a. Remove relief valve cover.
- b. Separate diaphragm (11) from body. (Use knife blade to separate it if it adheres).
- c. Remove relief valve lock nut (15).

**NOTE:** If elbow or other fittings are connected to outlet, remove them first.

- d. Support relief valve from beneath. Tap projecting end of housing (6) at discharge port with soft-faced hammer to

disengage locating pins. Valve assembly will drop through opening at base of body.

**NOTE:** Should locating pins start to disengage before lock nut is completely removed, support valve assembly before unthreading lock nut completely.



**FIGURE 16**  
RELIEF VALVE ASSEMBLY – BEECO MODEL 6C  
(1" – 6" SIZES)

## 2. Disassembly

- a. Loosen clamp bolt nut (13) slightly. If nut cannot be released by hand, or if clamp bolt turns with nut when wrench applied, disassemble spring as follows:
  - (1) Insert Allen wrench into hexagonal opening at bottom end of clamp bolt.
  - (2) Rest valve assembly on seat, and remove clamp bolt nut with second wrench. Hold Allen wrench to prevent clamp bolt from turning. (Fig. 17) *A second person must press down on lower diaphragm plate at the same time to prevent sudden release of nut.* After releasing nut, remove wrenches and allow spring to relax.

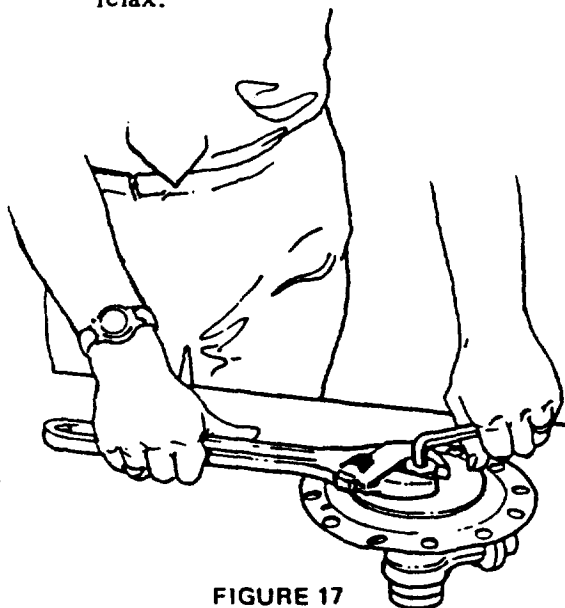


FIGURE 17  
REMOVING CLAMP BOLT NUT  
(2-WRENCH METHOD)

- b. Rest assembly on top of seat (1). Compress relief valve spring (9) by pressing down on lower diaphragm plate (12).
- c. Partially remove clamp bolt nut, and gradually release spring. Caution! If lower diaphragm plate does not rest against nut, clamp bolt gasket (8) is adhering to upper diaphragm plate (10) and preventing spring release. Tap top plate to release spring. Compress spring again, remove nut completely, and release spring (Fig. 18).
- d. Remove the lower diaphragm plate (12), diaphragm (11), upper diaphragm plate (10) and spring (9).

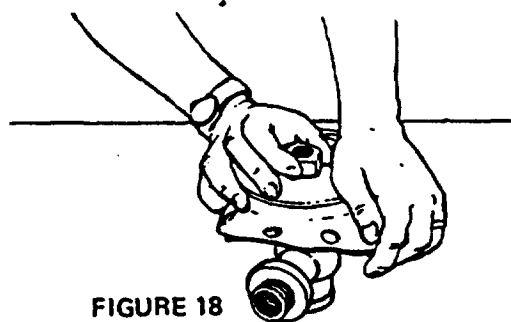


FIGURE 18  
RELEASING SPRING TENSION AFTER REMOVING  
CLAMP BOLT NUT

- e. Select a piece of bar stock that will fit in slot on top of relief valve seat (1) and place in vise.
- f. Position slot in seat over bar stock. Turn housing (6) counterclockwise, using an 18" or longer length of pipe, threaded into the housing, to remove seat.

NOTE: Use 3/4" pipe for 1" and 1-1/2" backflow preventer. Use 1-1/4" pipe for 2", 2-1/2" and 3" sizes. For 4" and 6" sizes use 2" pipe. (Standard pipe thread). (Fig. 19).

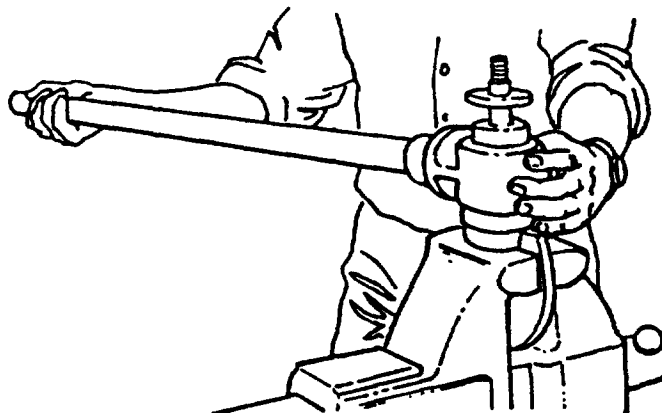


FIGURE 19  
REMOVING SEAT FROM HOUSING

- g. On 1" size, unscrew the clamp bolt (7) from the lower end of the stud. (Stud may remain attached to clamp bolt). The guide (3), spacer (5), and stud (2) can then be removed through the top of the housing for final disassembly. Remove upper and lower relief valve discs (4) from the spacer and clamp bolt (7).  
On larger sizes, remove the assembly bolt. This releases the guide (3), spacer (5), and clamp bolt (7). Withdraw the guide and spacer through the top of the housing (6).

### 3. Reassembly

- a. Insert new relief valve discs (4) into the spacer (5) and clamp bolt (7).
- b. Insert the assembled spacer, disc, guide and assembly bolt (or stud), into the housing (6) through the top opening.
- c. Apply pipe joint compound to threads of relief valve seat (1) and assemble to the housing (6). (If seat is equipped with an O-ring, apply vaseline to O-ring to hold it in slot).

Turn housing over and screw clamp bolt into position over bottom seat of housing. Tighten firmly by using socket wrench on assembly bolt and Allen wrench in end of clamp bolt (Fig. 20).

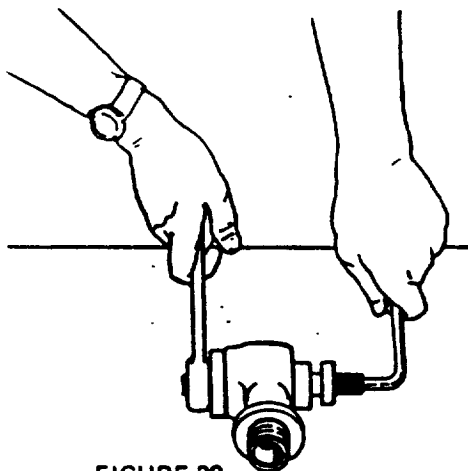


FIGURE 20  
REPLACING CLAMP BOLT IN POSITION

NOTE: On 1" and 1-1/2" devices, insert 1/2" drive socket wrench, without socket attached, between projections of relief valve guide. On larger sizes, use appropriate socket on assembly bolt.

- d. Place pencil or ink mark on side of clamp bolt and a matching mark on side of housing bottom seat (see Fig. 21).
- e. Tighten seat by placing slot over bar held in vise, using pipe inserted into housing opening, as in step f, disassembly.
- f. Continue tightening until pencil marks just separate. This assures simultaneous seating of the upper and lower valve discs, for correct operation of the relief valve.

- g. Rest partially assembled valve on top of seat (1).
- h. Place diaphragm (two thicknesses – 11) between upper (thicker – 10) and lower (thinner – 12) diaphragm plates, aligning diaphragm holes (in particular the hole for water passage through the cored inlet). Install new clamp bolt gasket (8).
- i. Place relief valve spring (9) on housing.
- j. Center diaphragm (11) and plates (10, 12) over clamp bolt (7). Press down on lower diaphragm plate to compress spring, and replace clamp bolt nut (13). Tighten firmly with wrench.

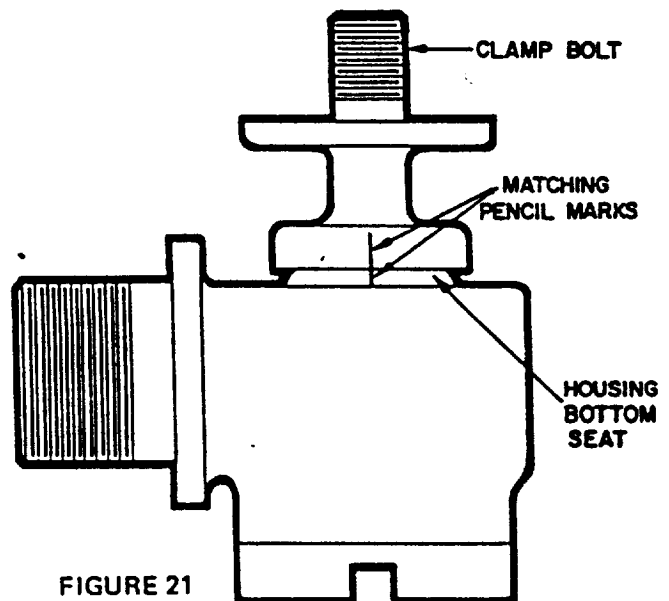


FIGURE 21  
MARKING CLAMP BOLT AND HOUSING  
BOTTOM SEAT FOR CORRECT DISC SEATING  
ADJUSTMENT (1" – 6" MODEL 6C)

### G. REPAIR OF RELIEF VALVES – 8" AND 10" SIZES (see Fig. 22).

#### 1. Removal

- a. See step F-1. Repair of relief valves (1" – 6" sizes).

NOTE: On 8" and 10" sizes, body may be inverted and relief valve lifted from opening (Fig. 23).

#### 2. Disassembly

- a. Loosen assembly bolt (6).
- b. Compress spring (12) by pushing down on relief valve housing (3).
- c. Remove assembly bolt (6) with socket wrench. This releases guide (7) and



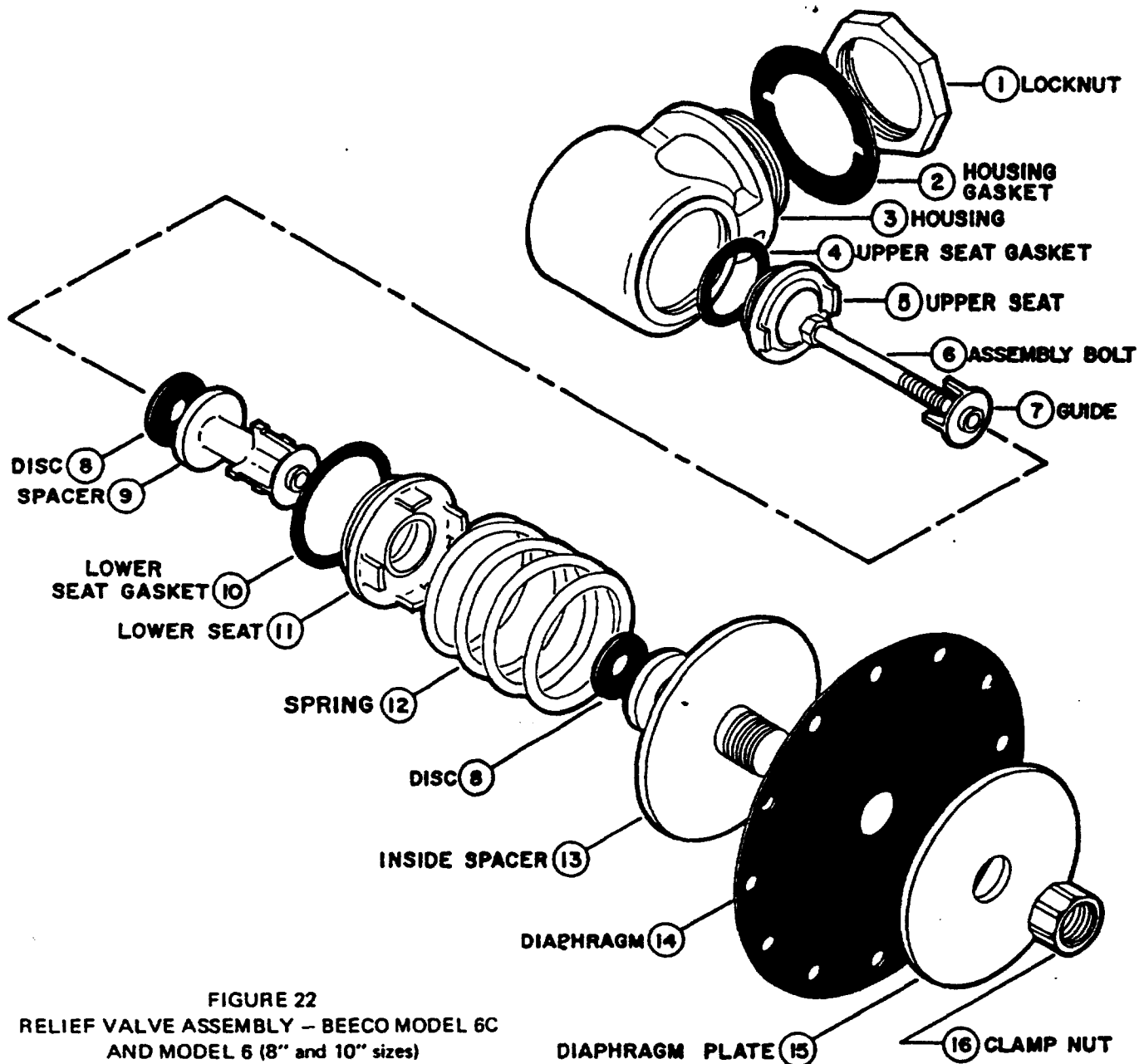


FIGURE 22  
RELIEF VALVE ASSEMBLY – BEECO MODEL 6C  
AND MODEL 6 (8" and 10" sizes)

- spacer (9). Allow spring to extend. The housing will now lift away from the inside spacer (13) (Fig. 24).
- d. Loosen lower seat (11) with seat wrench.
- e. Remove lower seat and spacer from housing.
- f. Loosen and remove upper seat (5) with seat wrench.
- g. Loosen and remove clamp nut (16), diaphragm plate (15) and diaphragm (14).

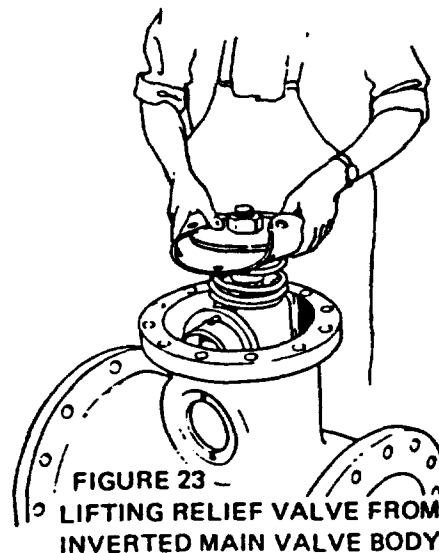


FIGURE 23 –  
LIFTING RELIEF VALVE FROM  
INVERTED MAIN VALVE BODY

### 3. Reassembly

- a. Replace upper and lower seat gaskets (4 and 10).
- b. Screw upper seat (5) into relief valve housing (3), using seat wrench.
- c. Insert new discs (8) into spacer (9) and inside spacer (13).
- d. Place spacer into relief valve housing (3), and screw lower seat (11) into housing, using seat wrench.

NOTE: To assure correct spacing of the seats, the bottom flange of the spacer should be within  $\pm .005$ " of being level with the face of the lower seat (Fig. 25). Lay a straight edge across lower seat with feeler gauge. Check clearance between straight edge and disc spacer with feeler gauge. Back off or tighten lower seat until correct clearance is attained.

- e. Reassemble inside spacer (13), diaphragm (14), diaphragm plate (15) and clamp nut (16). Position diaphragm hole for water passage in proper relation to opening of cored passageway.
  - f. Place spring (12) on inside spacer, set housing assembly on this spring, and insert assembly bolt (6) through the guide (7) and spacer.
  - g. Compress spring, engage assembly bolt in threads of inside spacer, and tighten bolt. Release spring tension.
- ### 4. Assembly of Relief Valve into Body
- a. Replace housing gasket (2) and insert relief valve assembly into body through base, positioning housing outlet in body opening. Engage locating pins.
  - b. Screw locknut on housing. Strike cut-out with driver to seat tightly.
  - c. Replace relief valve cover, making sure that the inlet water passage holes in the body, diaphragm and cover are aligned.

NOTE: If holes are misaligned, remove valve from body, disassemble diaphragm plates, and spring. Rotate diaphragm to correct position, reassemble valve and place in body.

- d. Replace cover plate and tighten bolts.

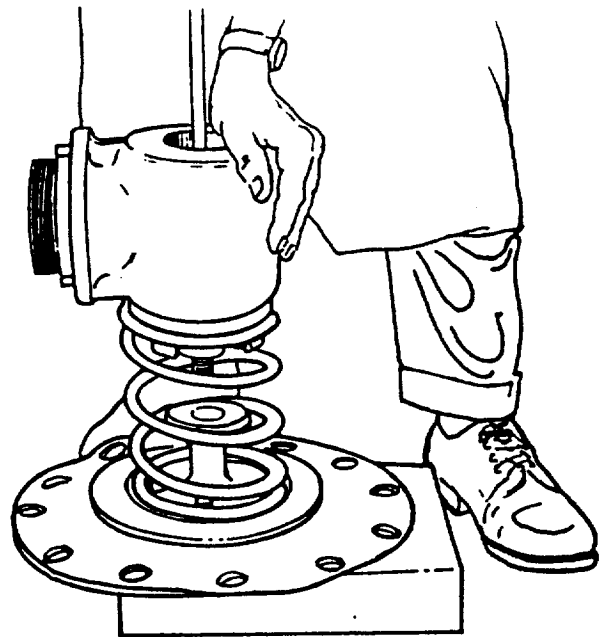


FIGURE 24  
REMOVING ASSEMBLY BOLT

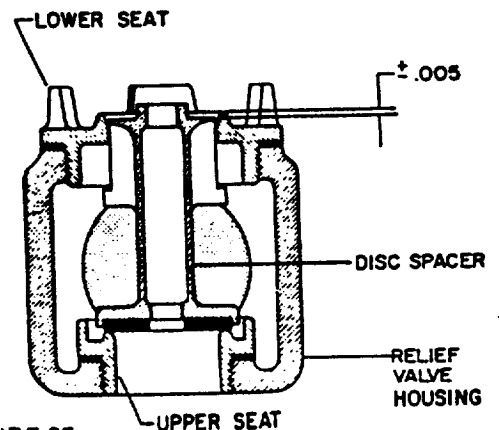
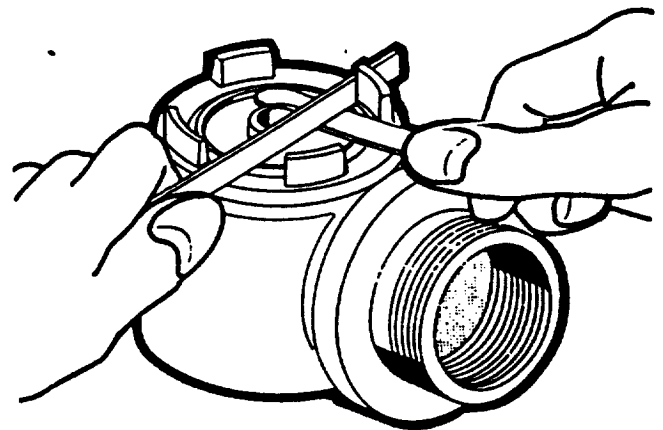


FIGURE 25  
GAUGING OPERATION FOR CORRECT SEAT SPACING  
(8" AND 10" MODEL 6C)

## MODEL 6 AND 6-U

### A. DESCRIPTION

The model 6 (and 6-U) BEECO Reduced Pressure Backflow Preventer is manufactured in 4", 6", 8" and 10" sizes. In October 1969 the 1-1/2", 2", 2-1/2", 3" and 16" sizes were discontinued. Parts will, of course, still be available for units in service.

All sizes have galvanized cast iron bodies — one-piece (1-1/2" — 6") or three-piece (8", 10"). Check valves are mounted in a horizontal position. External piping is used to direct line pressure beneath the relief valve diaphragm, rather than a cored passage within the body, as on the model 6-C. The relief valve opening is located on the right side of the device, in the direction of flow.

The 6-U designation is used to denote Underwriters Laboratories, Inc. acceptance of the device for use in fire lines.

### B. DISASSEMBLY OF CHECK VALVES, 1-1/2" — 6" SIZES, MODEL 6 (see Figs. 26, 27 and 28)

1. Close inlet and outlet shutoff valves. Drain the backflow preventer by opening test cocks No. 2, 3, and 4.
2. In order to remove the check valves, the backflow preventer must be removed from the line. In the 1-1/2" — 6" sizes, however, it is possible to remove all but one bolt at each body end flange; and then roll the backflow preventer enough to allow the check valve wrenches to be inserted in the ends.
3. Using a check valve wrench (Fig. 62), remove main and check valve assemblies.

4. Remove stud nut (1), using spring compressing tool as follows: (see Fig. 63).

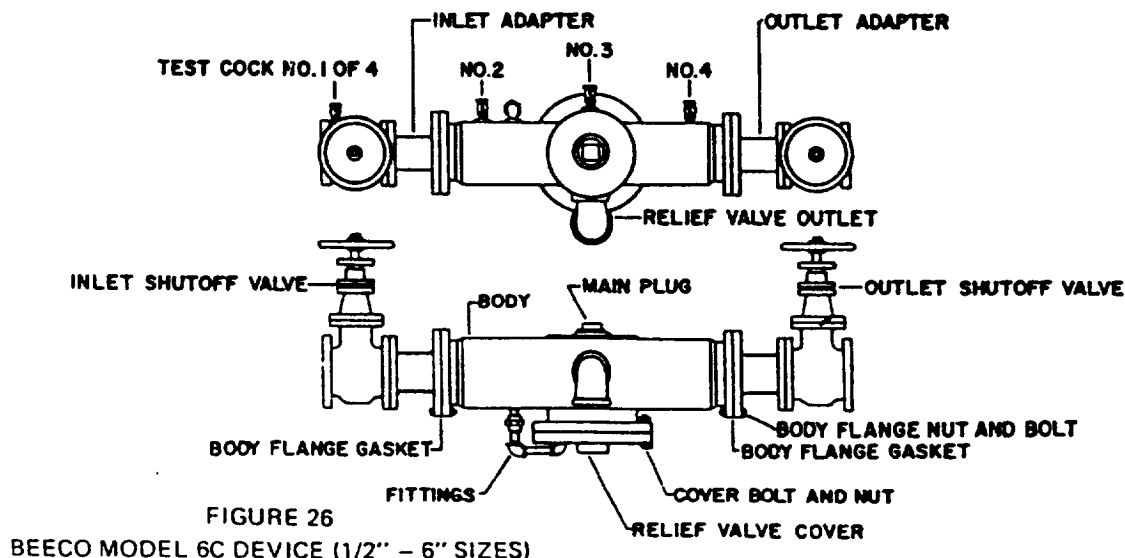
The spring compressing tool consists of 2 threaded rods, each with a loop or hook at one end, a round plate with 3 holes, 2 rod washers and 2 rod nuts.

The plate has two holes through which the threaded ends of the rods are passed, and a center hole large enough to pass over the spring retainer nut.

To install, rest valve assembly on vise, gripping disc holder projection (9) in vise jaws. Break stud nut (1) loose with wrench. Drop hooked ends of rods down inside spring (3) between cross-members of spring guide (2).

Engage hooks in cross-members of seat (5) and tighten rod nuts enough to release stud nut (1).

5. To release spring from seat, back off (loosen) rod nuts until spring has relaxed. Remove rod, nuts, washers and plate. (Rods are long enough to allow complete spring extension, or long enough to allow removal of plate with slight compression of spring by hand).
6. Lift spring retainer from spring; remove rods and spring from seat.
7. Remove spring guide (2), spring (3), and spacer (10) on second check valve, and seat (5).
8. Loosen the stud (4) with pipe wrench.
9. Remove the stud (4), valve guide (7), and disc (8) from the disc holder (9).



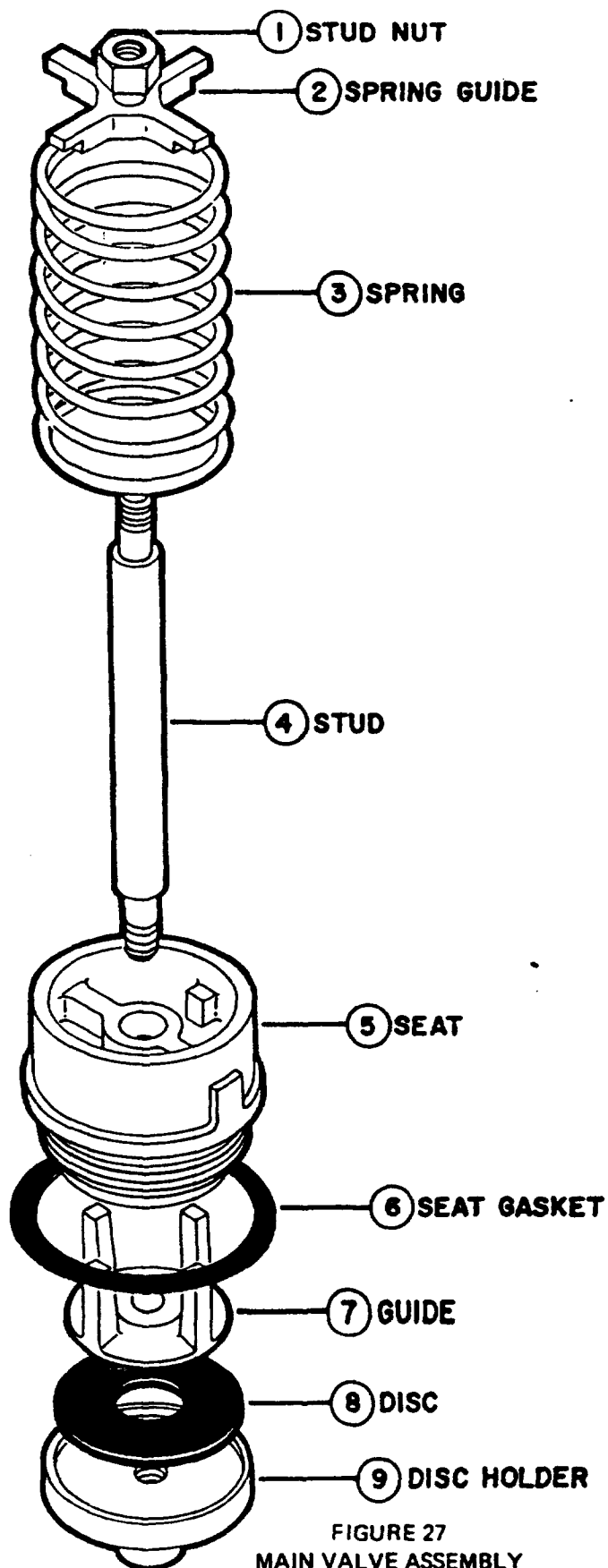
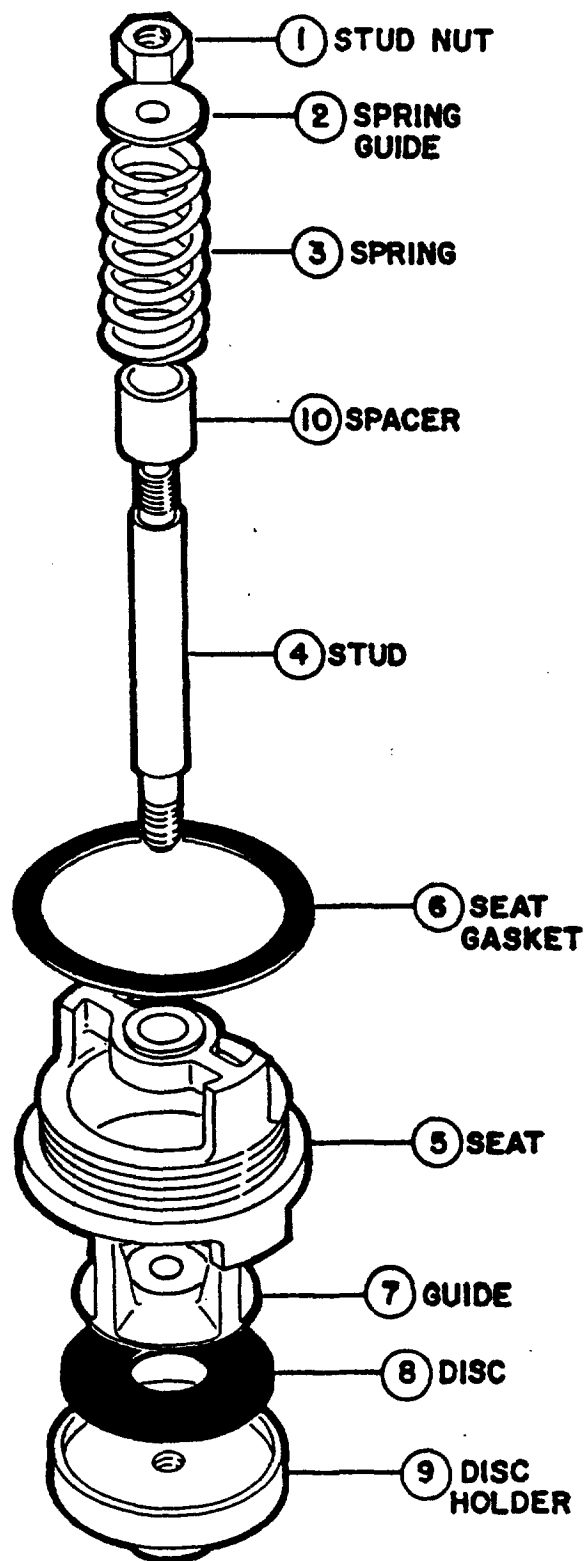


FIGURE 27  
MAIN VALVE ASSEMBLY  
BEECO MODEL 6 (1-1/2" - 6" SIZES)

FIGURE 28  
CHECK VALVE ASSEMBLY  
BEECO MODEL 6 (1-1/2" - 6" SIZES)



### C. REASSEMBLY OF CHECK VALVES, 1-1/2" - 6" SIZES, MODEL 6

1. Place new disc (8) in disc holder (9) and assemble guide (7) and stud (4) to it. (Insert *longer* machined end of stud into disc holder; except on 4" main valve only, insert *shorter* machined end).
2. Tighten stud with pipe wrench.
3. Place seat (5), spring (3), spacer (10) (second check valve only), and spring guide (2) over the stud.
4. Compress spring with spring compressing tool. Screw on stud nut (1) and tighten.
5. Replace check valve assemblies in the body, using new seat gaskets (6).
6. Tighten into position, using check valve wrench.

### D. DISASSEMBLY OF CHECK VALVES, 8" - 10" SIZES, MODEL 6, Figs. 29 and 30).

1. Remove the backflow preventer from the line.
2. Remove the check valve assemblies from the backflow preventer as follows:
  - a. Stand the backflow preventer upright on the inlet flange.

- b. Remove outlet adapter flange bolts, and lift off the outlet adapter (see Fig. 31).
- c. Remove the 8 seat cap screws (5) adjacent to the legs of the spring retainer (3) and lift the check valve assembly off with a hoist, or disassemble in place. (See Step 3.)
- d. Turn the body upright onto its outlet flange and remove inlet adapter flange bolts.
- e. Break union in control line and lift off inlet adapter with a hoist (Fig. 32).
- f. Remove the 8 seat cap screws (5) adjacent to the legs of the spring retainer, and lift the valve assembly off the inlet adapter with a hoist or disassemble in place. (See Step 3.) Both check valves are now ready to be disassembled.

#### 3. Disassemble check valves as follows:

- a. Remove the valve stem nut (1) and valve stem (8) (Fig. 33).
- b. Insert 1" threaded steel rod, 2 feet long, into top of disc holder (9). The rod must have machined "flats" on the end for attachment of a wrench (see Fig. 64).

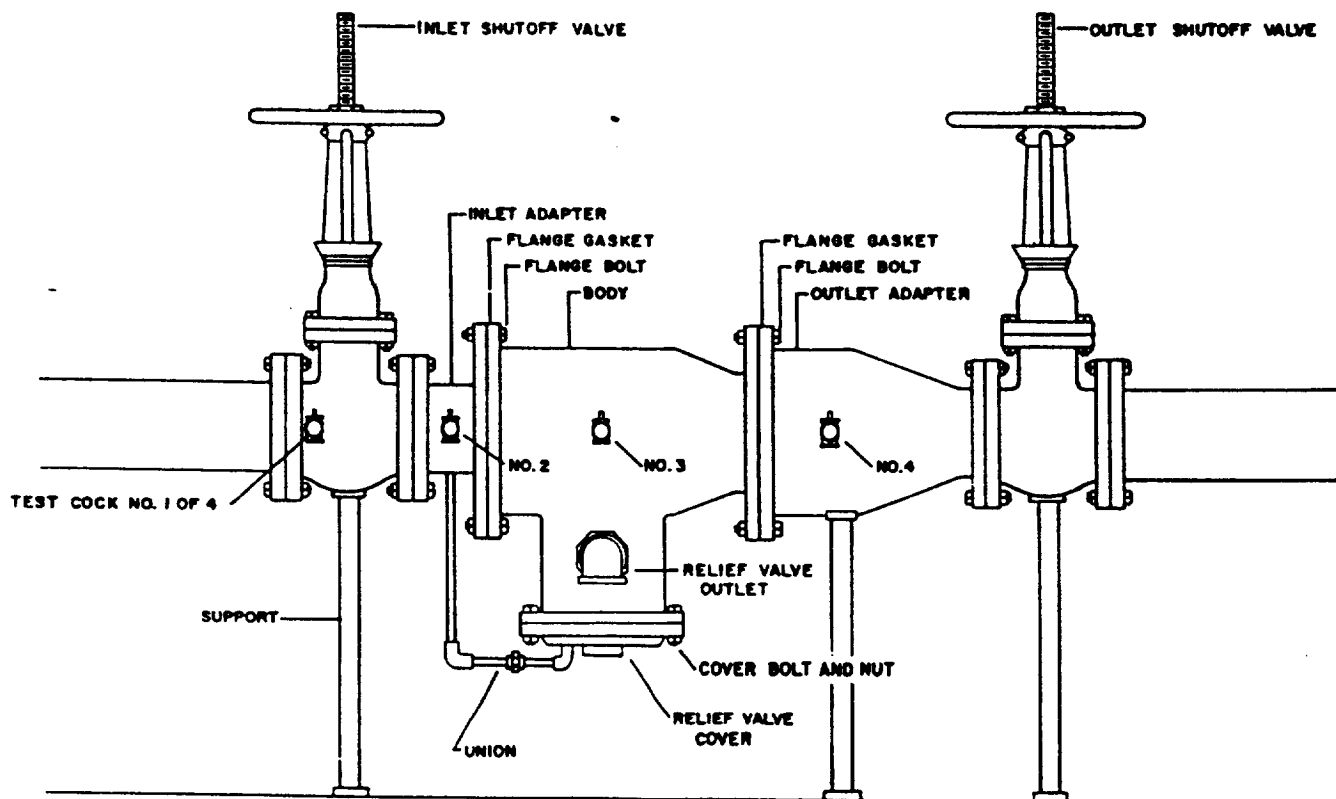


FIGURE 29  
BEECO MODEL 6 DEVICE (8" AND 10" SIZES)

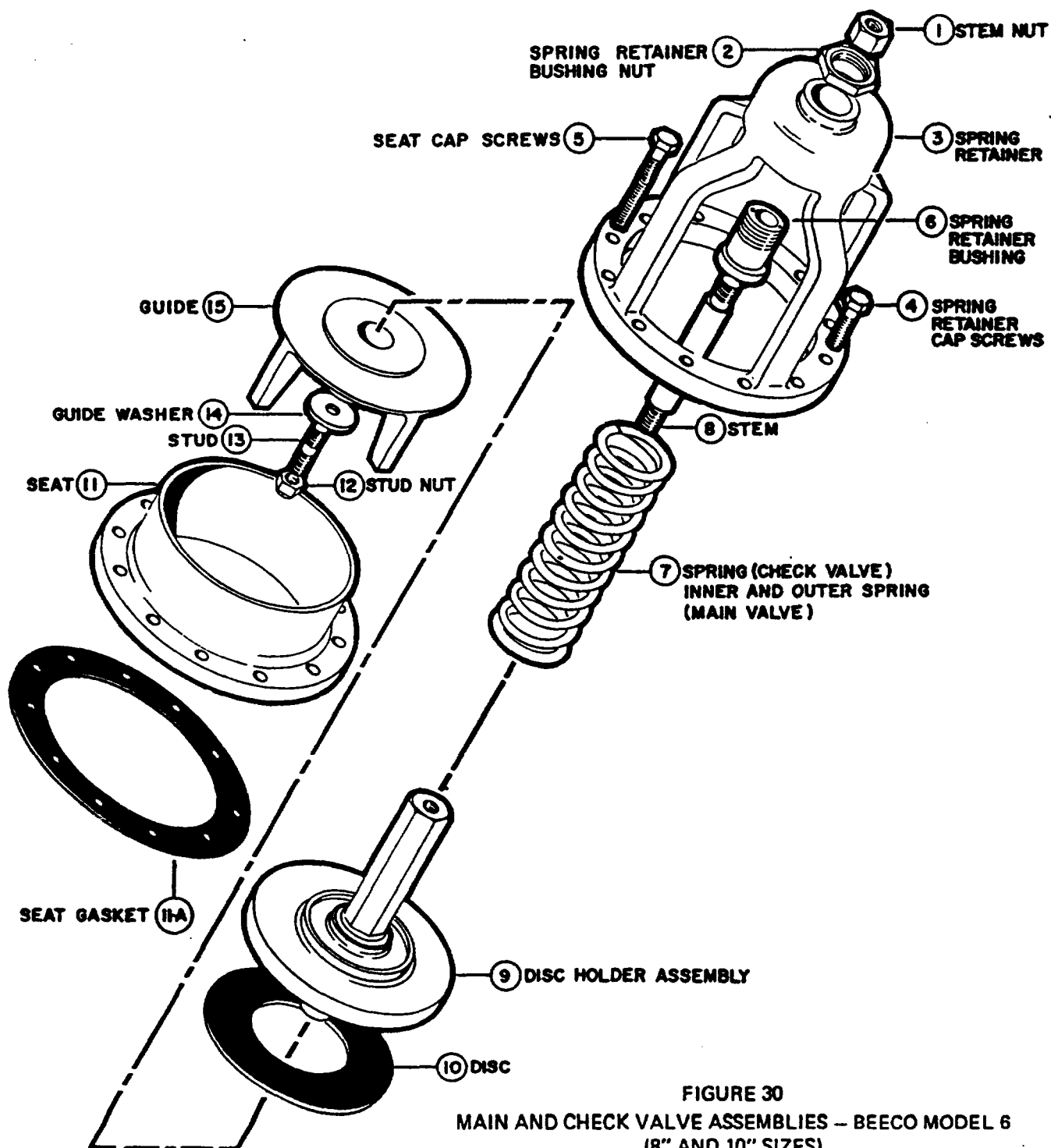


FIGURE 30  
MAIN AND CHECK VALVE ASSEMBLIES – BEECO MODEL 6  
(8" AND 10" SIZES)

- c. Place wrench on "flat" and tighten rod firmly.
- d. Place a heavy washer, 2-1/2" in diameter, with a 1-1/16" hole over the steel

- rod so that it rests on top of the spring retainer bushing nut (2).
- e. Run a 1" nut far enough down the rod so that it bears on the washer.

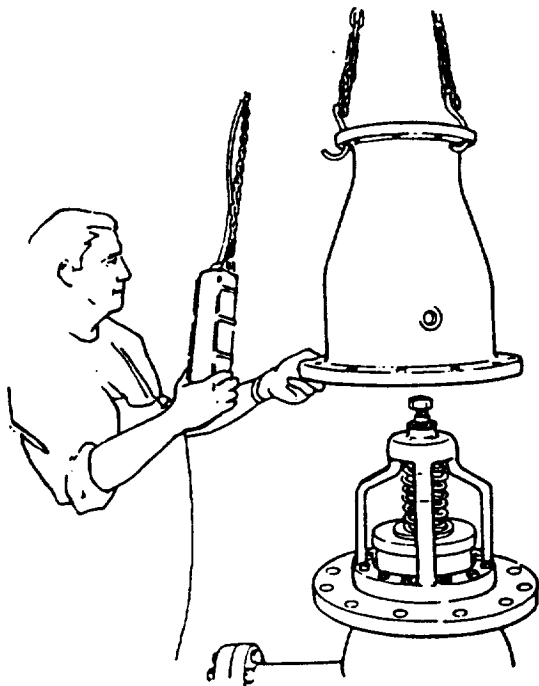


FIGURE 31  
REMOVING OUTLET ADAPTER

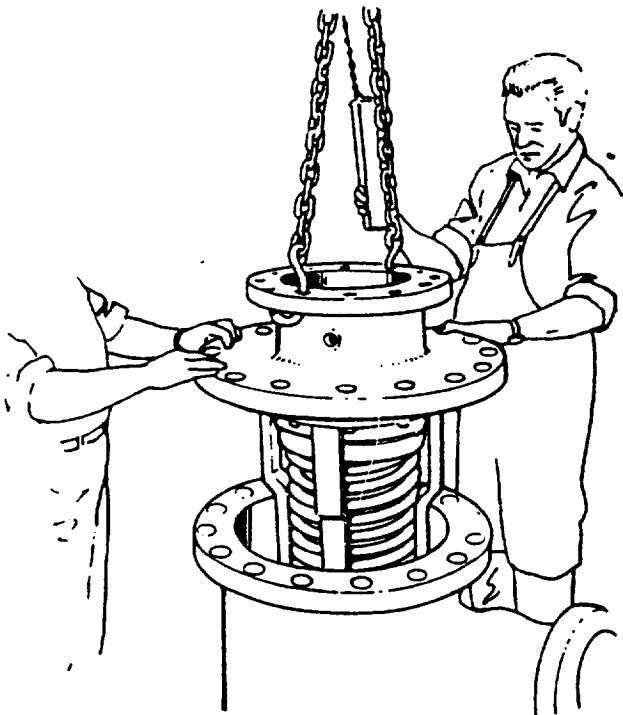


FIGURE 32  
REMOVING INLET ADAPTER WITH  
MAIN VALVE ASSEMBLY

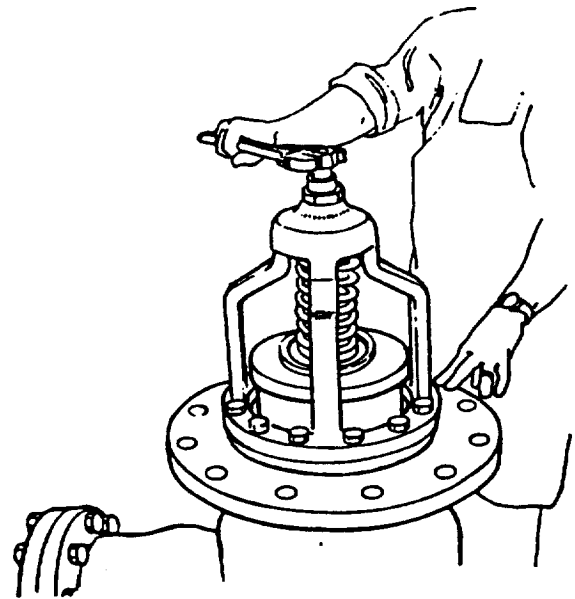


FIGURE 33  
REMOVING VALVE STEM NUT, CHECK VALVE

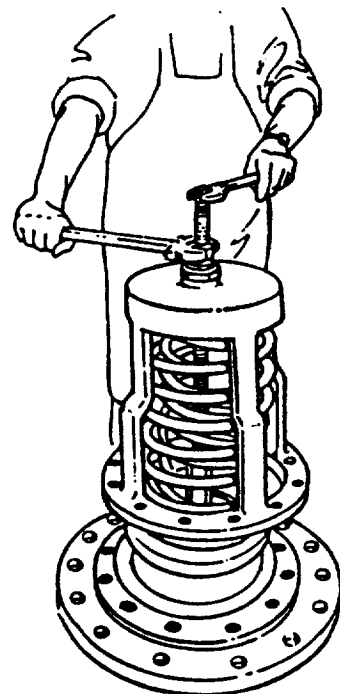


FIGURE 34  
BACKING OFF NUT TO EXTEND SPRING,  
MAIN VALVE

- f. Remove the 4 spring retainer cap screws (4) and back off the nut on the threaded rod until the spring (7) (check valve; inner and outer springs – main valve) is fully extended. Prevent rod from turning with wrench placed on flats (Fig. 34).

- g. Remove the nut; then remove the spring retainer (3) and spring (7) (Fig. 35 and 36).

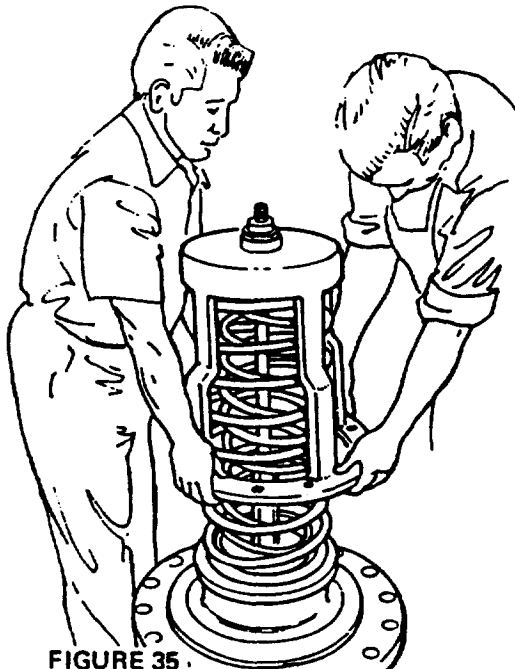


FIGURE 35.  
REMOVING SPRING RETAINER  
MAIN VALVE

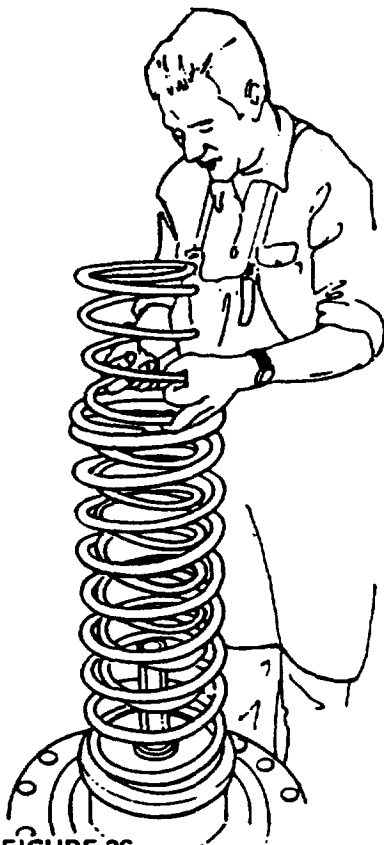


FIGURE 36  
REMOVING SPRINGS, MAIN VALVE

- h. Lift the disc holder assembly away from the seat (11) (Fig. 37).

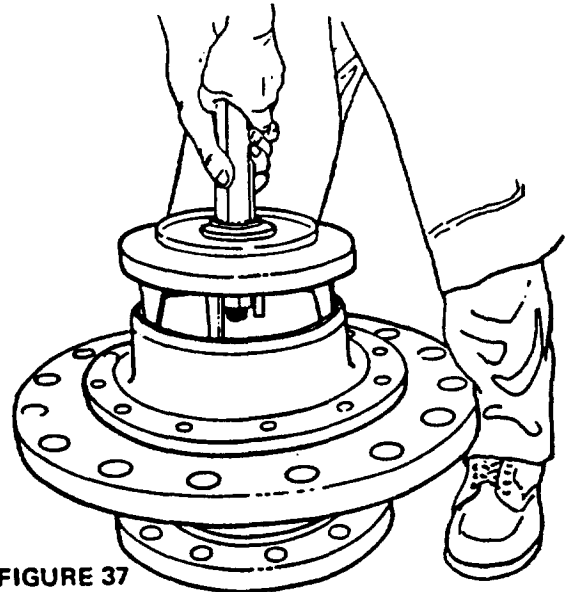


FIGURE 37  
REMOVING DISC HOLDER ASSEMBLY FROM SEAT,  
MAIN VALVE

- i. Remove the stud nut (12), guide washer (14), guide (15), and disc (10) from disc holder (9).  
j. Inspect spring retainer bushing (6). Replace if worn. (Remove nut (2) to release.)

NOTE: Before reassembling the check valves and adapters to the body, it is advisable to remove, repair and reassemble the relief valve into the body. (See relief valve repairs, 8" and 10" model 6C. Relief valves in both models are identical.)

4. Reassemble check valves as follows:
- Insert new disc (10) into disc holder (9) and reassemble guide (15), washer (14), and stud nut (12).
  - Rest the disc holder assembly on the face of the seat (11) and position the spring (7) and spring retainer (3) over it (Fig. 38). Locate the spring retainer so that its flange bolt holes are matched and aligned with the holes in the seat.
  - Install the threaded rod into the disc holder (see disassembly procedures). Place washer and nut on rod.



- d. Tighten down the nut to compress the spring enough to allow the spring retainer to be fastened to the seat with the 4 spring retainer cap screws (4). Avoid contact of spring with legs of spring retainer, as damage to plastic coating of spring may result (Figs. 39 and 40).

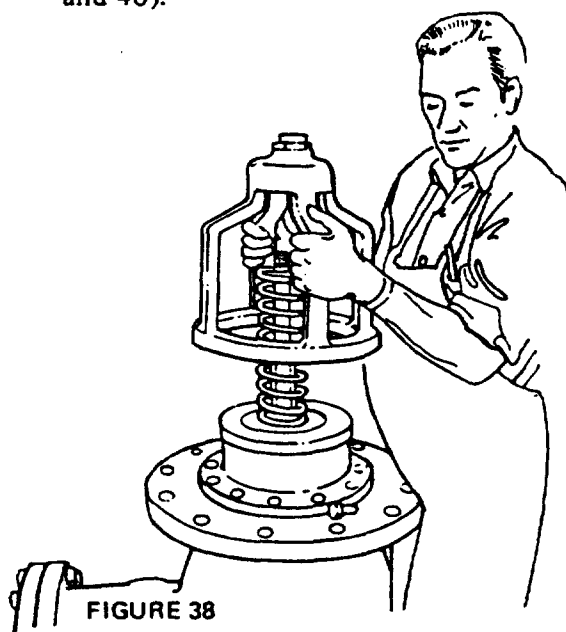


FIGURE 38  
POSITIONING SPRING RETAINER ON SEAT,  
CHECK VALVE

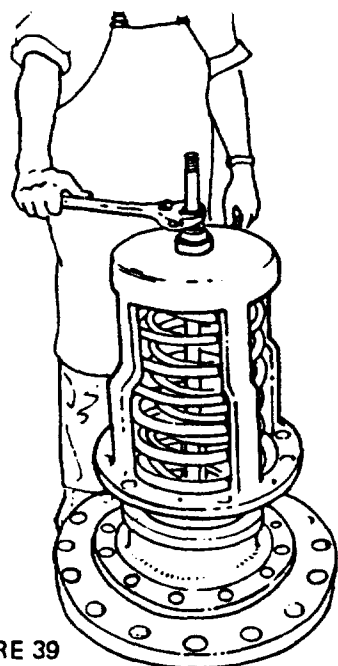


FIGURE 39  
TIGHTENING NUT TO COMPRESS SPRINGS,  
MAIN VALVE

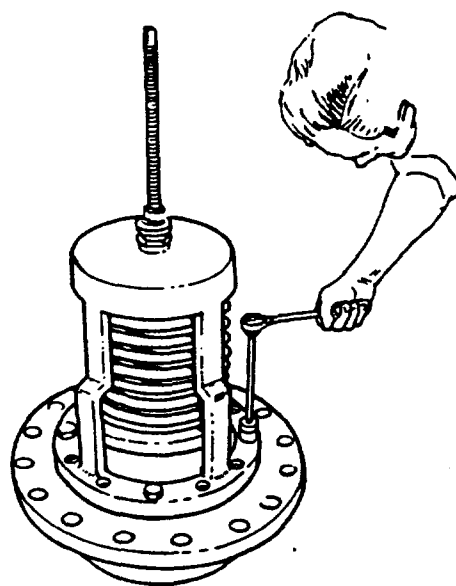


FIGURE 40  
REPLACING SPRING RETAINER CAP SCREWS

- e. Remove the nut, washer and threaded rod.
- f. Reassemble the valve stem (8) and tighten down the stem nut (1).
5. Reassembly of check valves and adapters to body:
  - a. Stand inlet adapter on its inlet flange.
  - b. Assemble first check valve assembly to the inlet adapter with the 8 seat cap screws (5). Use a new seat gasket (11A).
  - c. Rest the body on its outlet flange and set the assembled inlet adapter and check valve down on the body. Use a new flange gasket.
  - d. Bolt the body and inlet adapter together.
  - e. Rest body and inlet adapter on inlet flange.
  - f. Assemble second check valve assembly to the outlet flange of the body with the 8 seat cap screws. Use a new gasket.
  - g. Lift the outlet adapter over the second check valve assembly and set it down on the body with the flange gasket in place.
  - h. Bolt the body and outlet adapter together.

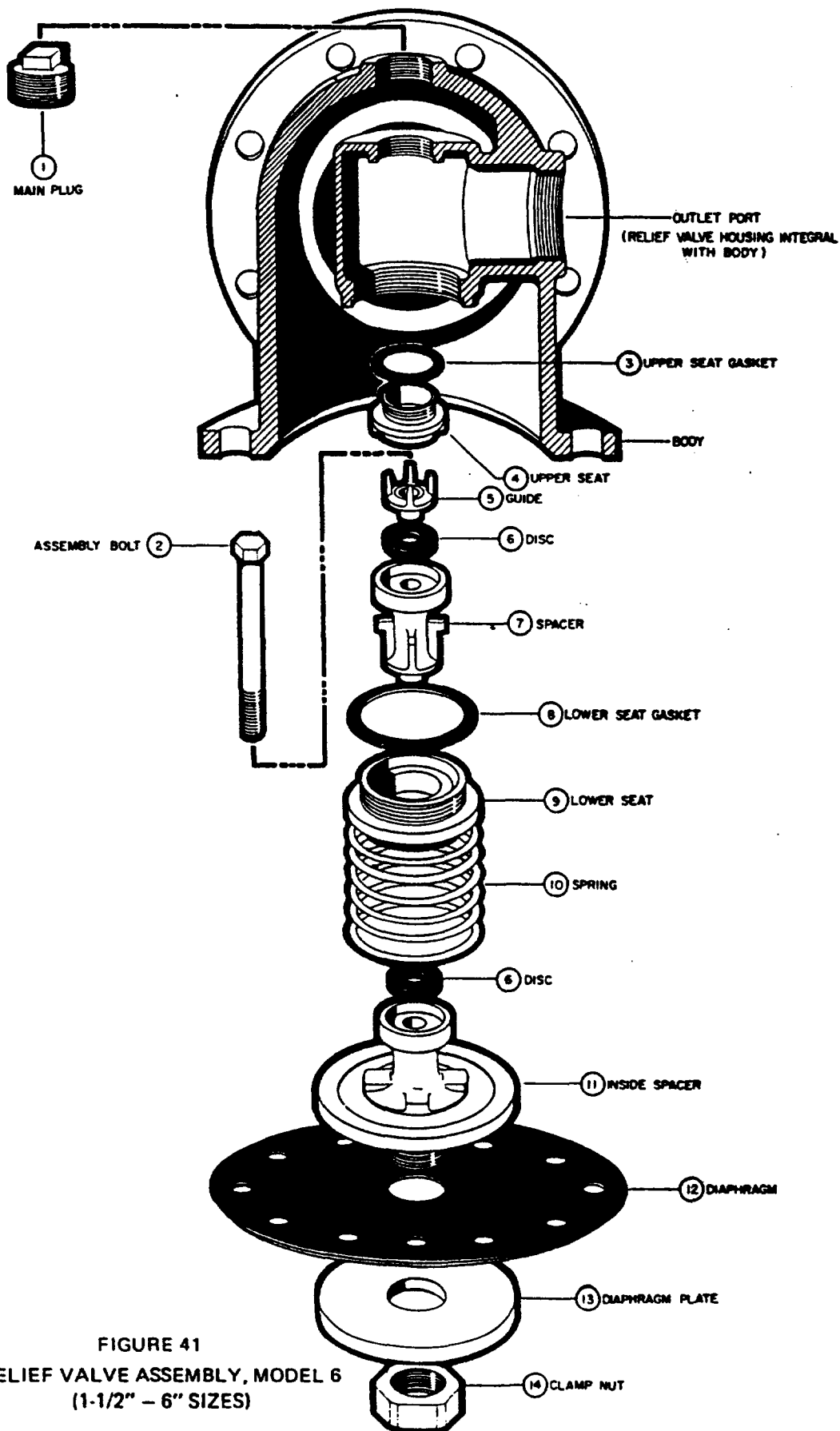
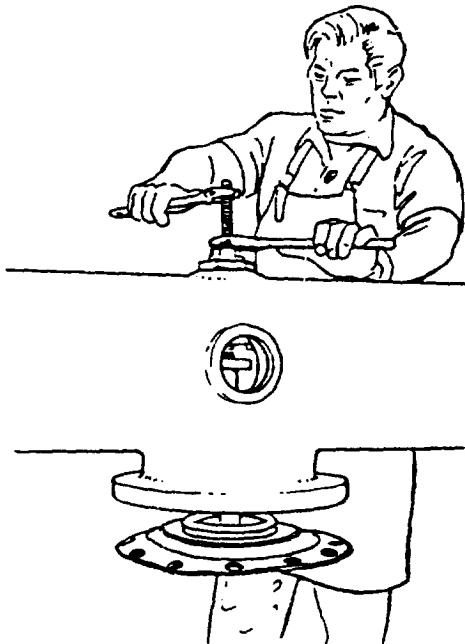


FIGURE 41  
RELIEF VALVE ASSEMBLY, MODEL 6  
(1-1/2" - 6" SIZES)

**E. DISASSEMBLY, RELIEF VALVE, 1-1/2" - 6" SIZES, MODEL 6 (see Fig. 41).**

1. Remove main plug (1) from top of back-flow preventer.
2. Remove the assembly bolt (2) through the main plug hole.
3. Screw threaded steel rod into the inside spacer (11) (see Fig. 65).
4. Place pipe plug bushing over the threaded rod, and screw it into the main plug hole.
5. Tighten rod with wrench placed on flats.
6. Run nut down the rod, and compress the spring (10) slightly by tightening the nut.
7. Break the union connection on the control line and remove the cover.
8. Back off the nut on the threaded rod to allow the spring to extend. Keep rod from turning by holding wrench on flats. This also releases the diaphragm assembly (6, 11, 12, 13, 14) (Fig. 42).



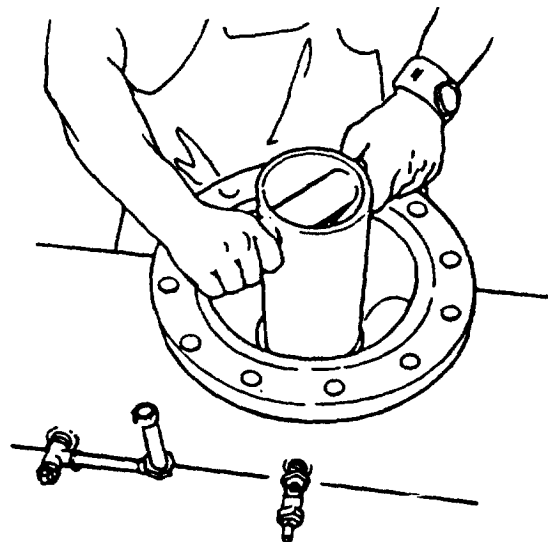
**FIGURE 42**  
**BACKING OFF NUT TO EXTEND SPRING,**  
**RELIEF VALVE**

9. Support diaphragm assembly and remove nut completely to release assembly, spring and rod from body. (If possible, roll back-flow preventer to an inverted position and lift diaphragm assembly, spring and rod from the body) (Fig. 43).
10. Detach rod from diaphragm assembly with wrench placed on flats.



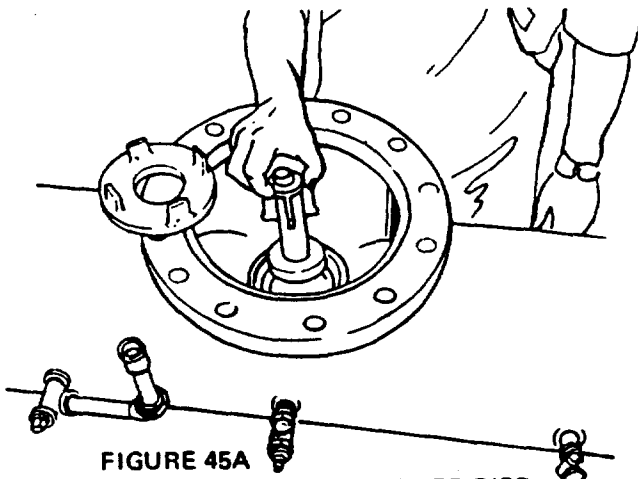
**FIGURE 43**  
**REMOVING RELIEF VALVE**  
**DIAPHRAGM ASSEMBLY**

11. Remove lower seat (4) with special seat wrench (Fig. 44).



**FIGURE 44**  
**REMOVING TOP SEAT**

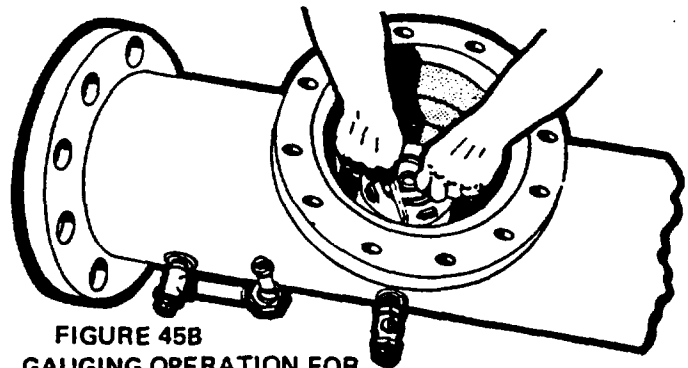
12. Remove the spacer, upper disc (6), and guide (5) (Fig. 45A). Using a seat wrench, remove the upper seat (4).
13. Remove clamp nut (14), diaphragm plate (13), and diaphragm (12) from inside spacer (11).



**FIGURE 45A**  
REMOVING SPACER AND LOWER DISC,  
TOP SEAT ON FLANGE

**F. REASSEMBLY, RELIEF VALVE, 1-1/2" – 6" sizes, Model 6.**

1. Place new diaphragm and the diaphragm plate on inside spacer and tighten the clamp nut.
2. Insert new disc into inside spacer.
3. Reassemble the upper seat into the housing, using a new seat gasket (3). Tighten with seat wrench.
4. Insert new disc into spacer and place this assembly into the relief valve housing.
5. Using a new gasket (8), reassemble the lower seat into the housing with a seat wrench. To assure proper spacing of the seats, the bottom flange of the spacer must be within .005" above or below the face of the lower seat. (See gauging procedure 8" and 10" Model 6C. The upper seat may also be loosened or tightened to achieve correct spacing of the seats.) (see Fig. 45B)
6. Screw threaded rod into inside spacer and, with spring in place, insert the rod, with diaphragm assembly attached, through the disc spacer, bushing and pipe plug bushing.
7. Place nut on rod and tighten to compress the spring and draw the discs snugly against the upper and lower seats.
8. Bolt on the relief valve cover, making sure that the control line is in alignment.
9. Turn unit upright.
10. Loosen the nut on the threaded rod to release spring tension.
11. Place wrench on flats and remove rod.
12. Set the guide on the upper disc; insert and tighten the assembly bolt.
13. Apply pipe joint compound and replace the main plug.
14. Tighten union on control line.



**FIGURE 45B**  
GAUGING OPERATION FOR  
CORRECT SEAT SPACING (8" AND 10" MODEL 6)

**BEECO REDUCED PRESSURE  
BACKFLOW PREVENTER, 3/4" Model 12  
DISASSEMBLY – MAIN AND RELIEF VALVES**  
(see Figs. 46A and 46B)

1. Remove 8 cap screws (1) to release cover (2) from body (16).
2. Lift main and relief valve assembly and main valve spring (10) from body. Caution! Spring (10) exerts force directly on cover (2)
3. Unscrew relief valve holder (13) from main valve disc holder (3). This releases disc holder (3), main valve disc (4), main valve guide (5) and relief valve spring (12).
4. Unscrew main valve stem guide (11) from main valve seat (6). This releases the two diaphragm plates (8), diaphragm (9) and main valve seat gasket (7).
5. Remove main valve disc (4) from holder (3) and replace with new disc. Discard old disc, diaphragm and gasket.

**REASSEMBLY**

1. Place new gasket (7) on main valve seat (6).
2. Insert new diaphragm (9) between plates (8).
3. Insert main valve seat (6) through plate opening and assemble to stem guide (11).
4. Place relief valve spring (12) over holder (13). Insert holder through hole in stem guide (11) and hole in main valve guide (with guide projecting into main valve seat) (6). Assemble relief valve holder to disc holder (3).
5. Attach new relief valve disc (14) with screw (15).
6. Replace main valve spring (10), and position valve assembly in body.
7. Turn assembly so that diaphragm holes align with bolt holes. Replace cover (2) and fasten with cap screws (1).

## DISASSEMBLY – CHECK VALVE

1. Remove cap (17). This releases spring (18), disc holder (19), disc (20) and guide (21).
2. Release disc (20) by unscrewing guide (21). Discard old disc.
3. Place new disc on holder and screw guide in place.
4. Insert disc holder assembly in body, replace spring and screw cap in place.

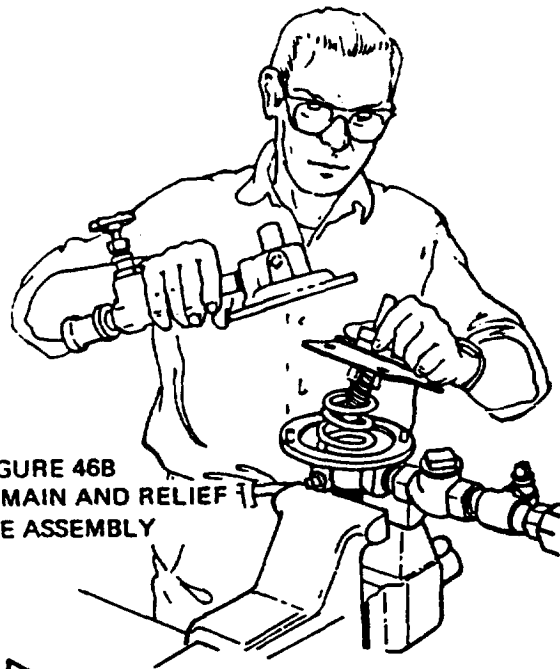


FIGURE 46B  
REMOVING MAIN AND RELIEF  
VALVE ASSEMBLY

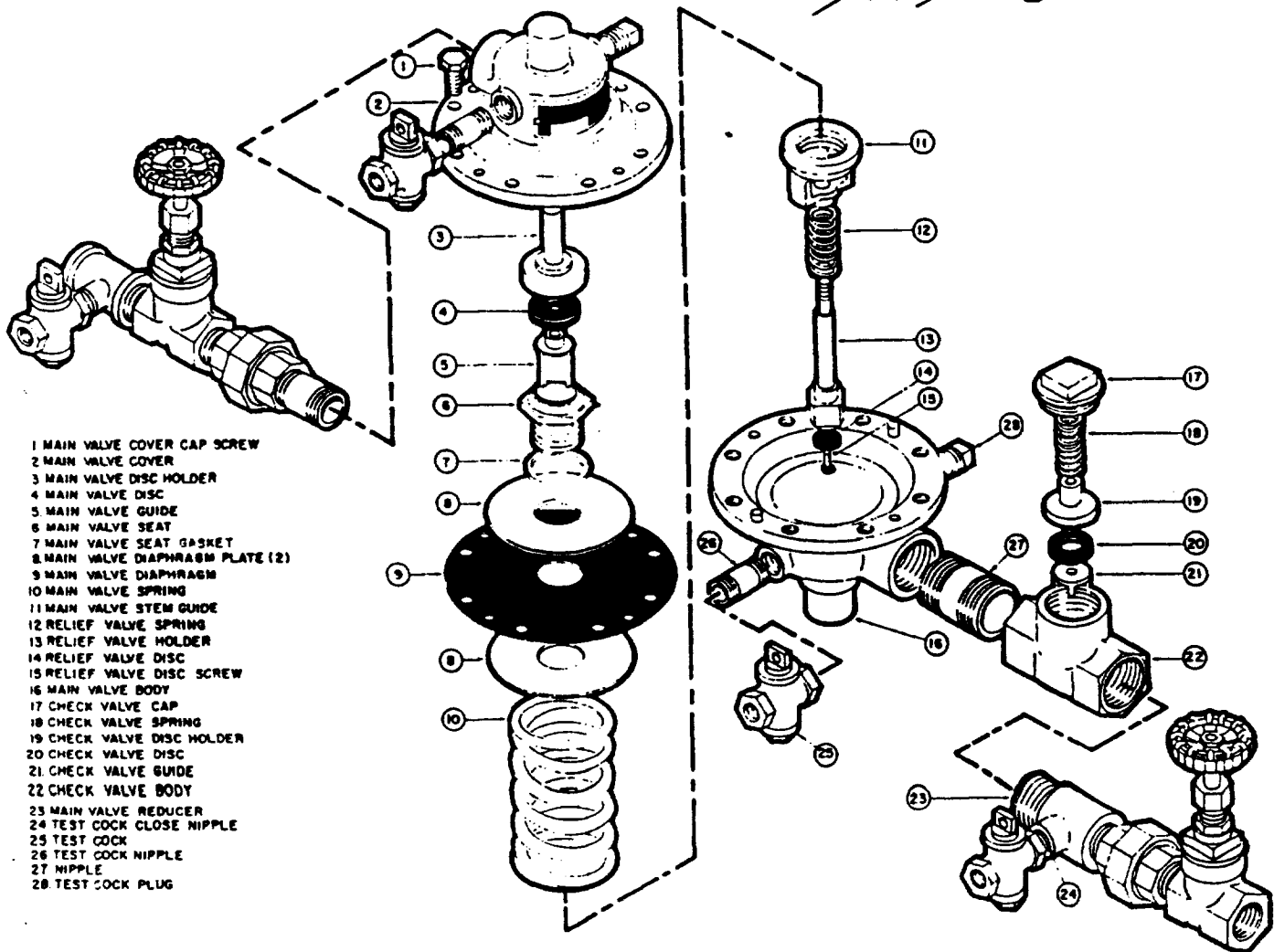


FIGURE 46A  
3/4" BEECO MODEL 12

## REPAIR PROCEDURE – MODEL 10 (1" and 1-1/4" sizes)

### A. PRELIMINARY STEPS

1. Close inlet and outlet shutoff valves.
2. Open test cocks 2, 3, and 4 to release pressure and drain the Backflow Preventer.

### B. REPAIR OF MAIN VALVE

1. Disassembly (see Figs. 47, 48 and 49)

- a. Remove cover by unscrewing cover cap screws.

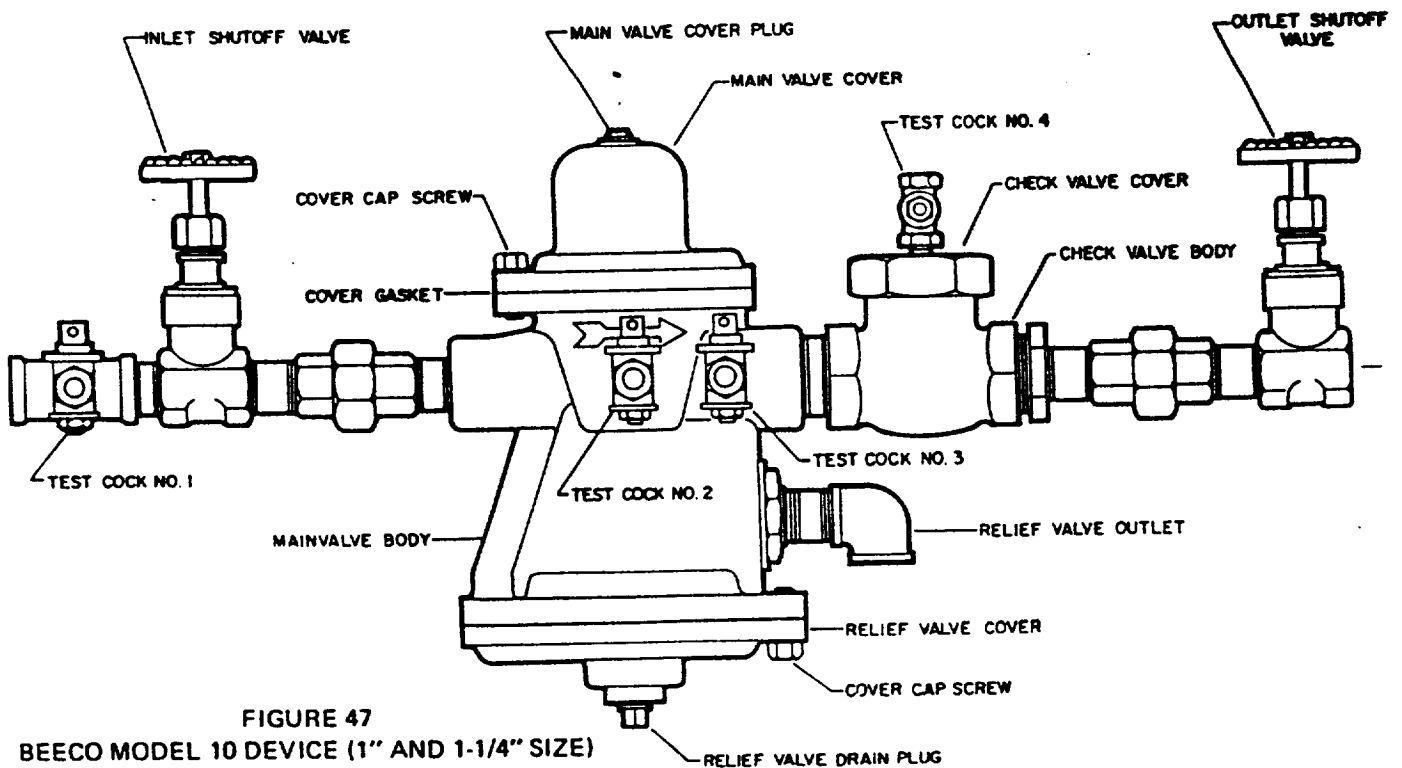
NOTE: Main valve spring (3) exerts pressure against cover. When cap screws are removed, cover will be lifted about 3/8" (spring travel is stopped by spring retainer (2)).

- b. Break spring retainer nut (1) free with wrench, holding spring to prevent valve assembly from turning.
- c. Screw threaded rods into flange of device (Refer to Fig. 66).
- d. Place spring removal plate over rods and rest on spring retainer (2).
- e. Install washers and rod nuts. Tighten nuts against plate enough to compress spring (3) slightly. This forces spring retainer downward to release spring retainer nut (1).

- f. Remove spring retainer nut, and back off (loosen) rod nuts until spring is completely extended.
- g. Remove plate, threaded rods, spring retainer, spring and balance of valve assembly.
- h. Remove disc cap screw (11). This releases guide (10) and disc (9).
- i. Remove clamp nut (4). This releases spring guide washer (5), diaphragm plate (6), and diaphragm (7) from disc holder (8).

2. Reassembly

- a. Place new diaphragm (7) on disc holder (8). Replace diaphragm plate (6) and spring guide washer (5). Install clamp nut (4) and tighten firmly.
- b. Install new disc (9) in disc holder (8), replace guide (10) and tighten cap screw (11) firmly in place. Place assembly in body.
- c. Place spring (3) on diaphragm plate (6).
- d. Place spring retainer (2) on spring (3).
- e. Install plate and threaded rods. Compress spring enough to permit replacement of spring retainer nut (1).



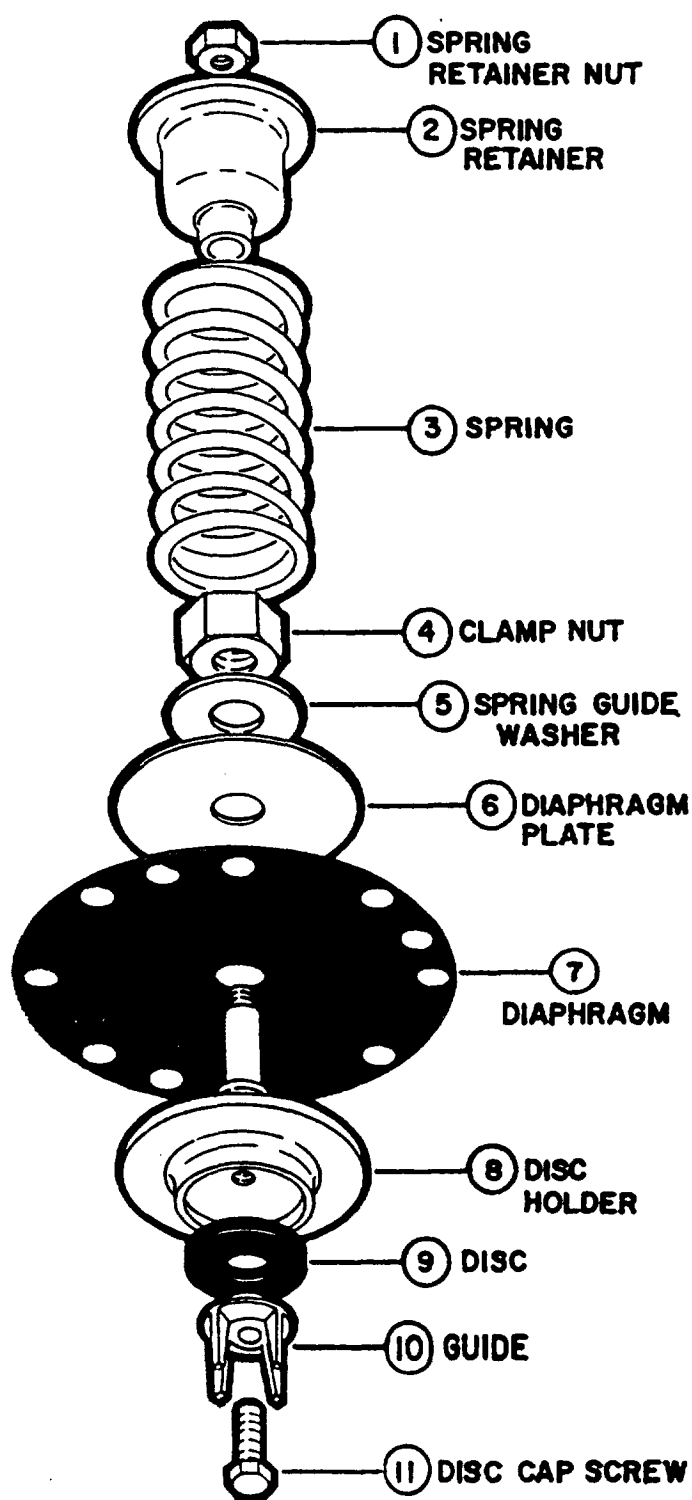


FIGURE 48  
MAIN VALVE ASSEMBLY  
BEECO MODEL 10 (1" AND 1-1/4" SIZES)

- f. Remove plate and rods; tighten nut firmly with wrench.
- g. Align bolt holes on diaphragm with holes on body, paying particular attention to hole for cored passageway to zone of reduced pressure.
- h. Replace cover.

#### C. REPAIR OF CHECK VALVE

1. Disassembly (see Fig. 49)
  - a. Unscrew cap nut (5).
  - b. Remove cap (6).
  - c. Lift out spring (1) and disc holder (2).
  - d. Unscrew disc guide (4).
  - e. Remove disc (3).
2. Reassembly
  - a. Install new disc (3).
  - b. Replace disc guide (4).
  - c. Install disc holder (2) and spring (1).
  - d. Replace cover and retaining nut.

#### D. REPAIR OF RELIEF VALVE

As relief valve is identical to relief valve used in the Model 6C, 1" - 6" sizes, refer to Model 6C section for procedure.

### BEECO MODEL VC DOUBLE CHECK VALVE ASSEMBLIES

#### DESCRIPTION AND OPERATION

These assemblies are used to prevent backflow of polluted water or other contaminants into potable water supply lines, where no health hazard or potential health hazard exists. They consist of two spring-loaded check valves, two gate valves and four test cocks. The check valves open and permit flow in the normal direction of flow. A spring on each valve holds the valve closed against any flow in the opposite direction of normal flow.

#### INSTALLATION

1. Flush out inlet lines.
2. Allow ample clearance for testing and removal from line for repairs.
3. This unit should be installed above ground level, but may be installed in pits with proper drainage.
4. The assembly may be installed horizontally, or vertically, if the direction of flow is upward.

## REPAIR OF 2" BEECO MODEL VC DOUBLE CHECK VALVE ASSEMBLIES

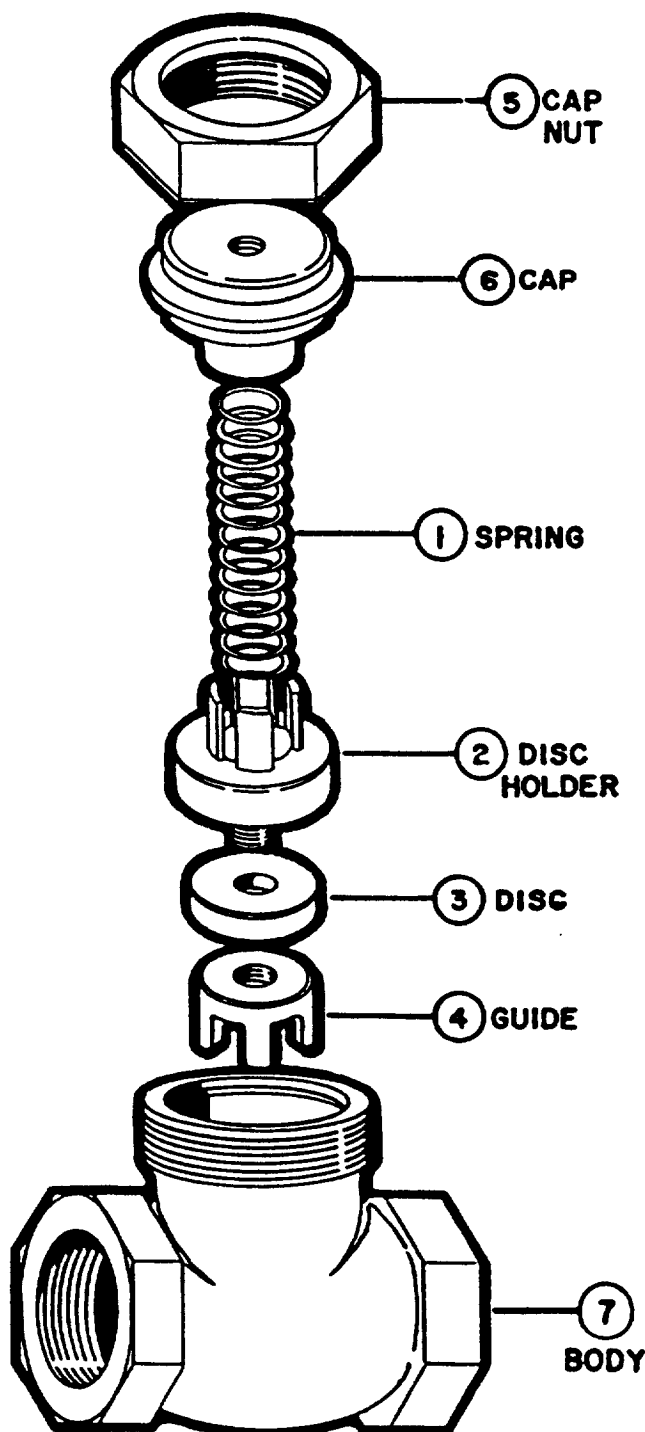


FIGURE 49  
CHECK VALVE ASSEMBLY, BEECO MODEL 10  
(1" AND 1-1/4" SIZES)

### A. PRELIMINARY STEPS (see Fig. 50)

1. Close shutoff valves (1, 6)
2. Break the two union connections (2).
3. Remove valves and adapters.

### B. REPAIR OF FIRST CHECK VALVE

1. Disassembly (see Fig. 50)
  - a. Remove inlet adapter (5). This releases valve assembly, including spring (7).
  - b. Remove stud nut (12). Leave stud in place. This releases guide (10).
  - c. Remove disc (9) from disc holder (8).
2. Reassembly
  - a. Install new disc (9).
  - b. Install guide (10).
  - c. Install stud (11).
  - d. Install disc holder assembly.
  - e. Install spring (7).
  - f. Stand valve assembly on outlet adapter.
  - g. Replace body flange gasket (13).
  - h. Assemble inlet adapter to body (4).
  - i. Install cap screws.

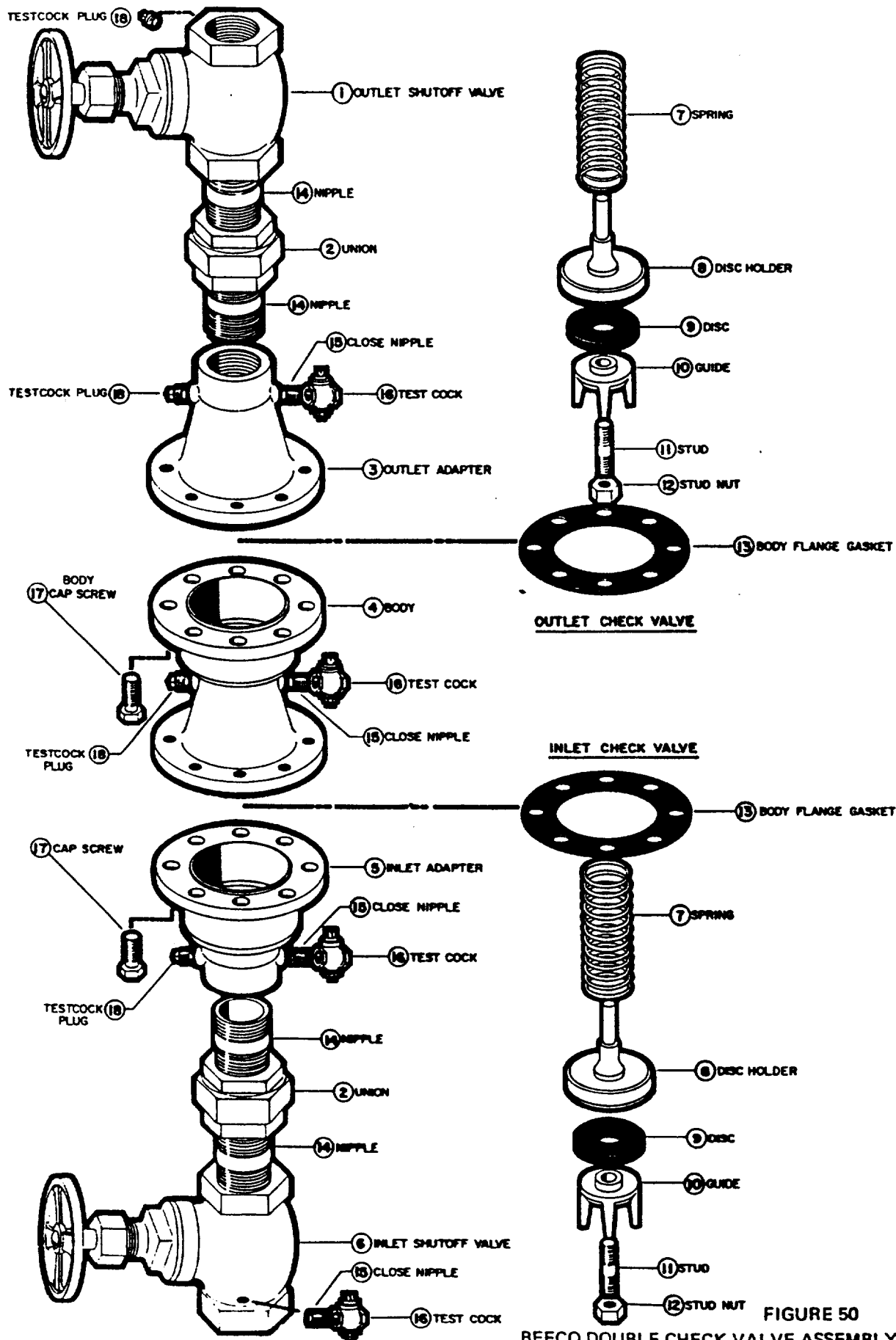
### C. REPAIR OF SECOND CHECK VALVE

1. Disassembly (see Fig. 50)  
Follow same procedure used for first check valve, after removing outlet adapter.
2. Reassembly  
Follow same procedure used for first check valve; then attach outlet adapter.

### D. FINAL STEPS

1. Connect valves and adapters to union connections.
2. Open shutoff valves.





## **REPAIR OF 3" BEECO MODEL VC DOUBLE CHECK VALVE ASSEMBLIES**

### **A. PRELIMINARY STEPS**

1. Close shutoff valves.
2. Unbolt assembly from valves. Or, remove all but one bolt from each end of outlet check valve only and roll it out of line. This permits access to internal parts.

### **B. REPAIR OF CHECK VALVES**

1. Disassembly (see Fig. 51)
  - a. Unscrew retainer (1) by inserting 1/2" square piece of bar stock in end slot and turning with wrench; or, strike end slot with driver to loosen.
  - b. Remove balance of valve assembly, including spring (2).
  - c. Unscrew stud nut (7). This releases guide (5).
  - d. Remove disc (4) from disc holder (3).
2. Reassembly
  - a. Replace disc (4) and install guide (5) and stud nut (7).
  - b. Place above assembly in body.
  - c. Replace spring and screw retainer in place.
  - d. Reassemble check valve to shutoff valve and other check valve, using new gasket (14) if necessary.

### **C. FINAL STEPS**

1. Reassemble check valve to shutoff valve and other check valve, replacing flange gaskets if necessary.
2. Open shutoff valves.

## **REPAIR OF 4" BEECO MODEL VC DOUBLE CHECK VALVE ASSEMBLIES**

### **A. PRELIMINARY STEPS**

1. Close shutoff valves.
2. Unbolt assembly from valves. Or, remove all but one bolt from each end of outlet check valve only and roll it out of line. This permits access to internal parts.

### **B. REPAIR OF CHECK VALVE**

1. Disassembly (see Fig. 51)

- a. Unscrew retainer (1) by inserting 1/2" square piece of bar stock in end slot and turning with wrench; or, strike end slot with driver to loosen.
  - b. Grasp stop (3A) and remove entire valve assembly.
  - c. Rest assembly on guide (5).
  - d. Press down on retainer (1) to compress spring (2).
  - e. Unscrew stop and gradually release pressure on retainer. Remove retainer and spring.
  - f. To replace disc (4), unscrew stud nut (7). This releases guide (5). Remove disc (4).
2. Assembly
    - a. Place new disc (4) on disc holder (3).
    - b. Place guide (5) on disc holder and install stud nut (7).
    - c. Place spring on disc holder.
    - d. Place retainer (1) on spring (2). Compress spring to permit assembly of stop (3A) to disc holder.
    - e. Install valve assembly in body.
    - f. Press retainer, compressing spring to allow engagement of retainer threads. Screw retainer in place, tightening firmly.

### **C. FINAL STEPS**

1. Reassemble check valves to each other and to shutoff valves, replacing flange gaskets if necessary.
2. Open shutoff valves.

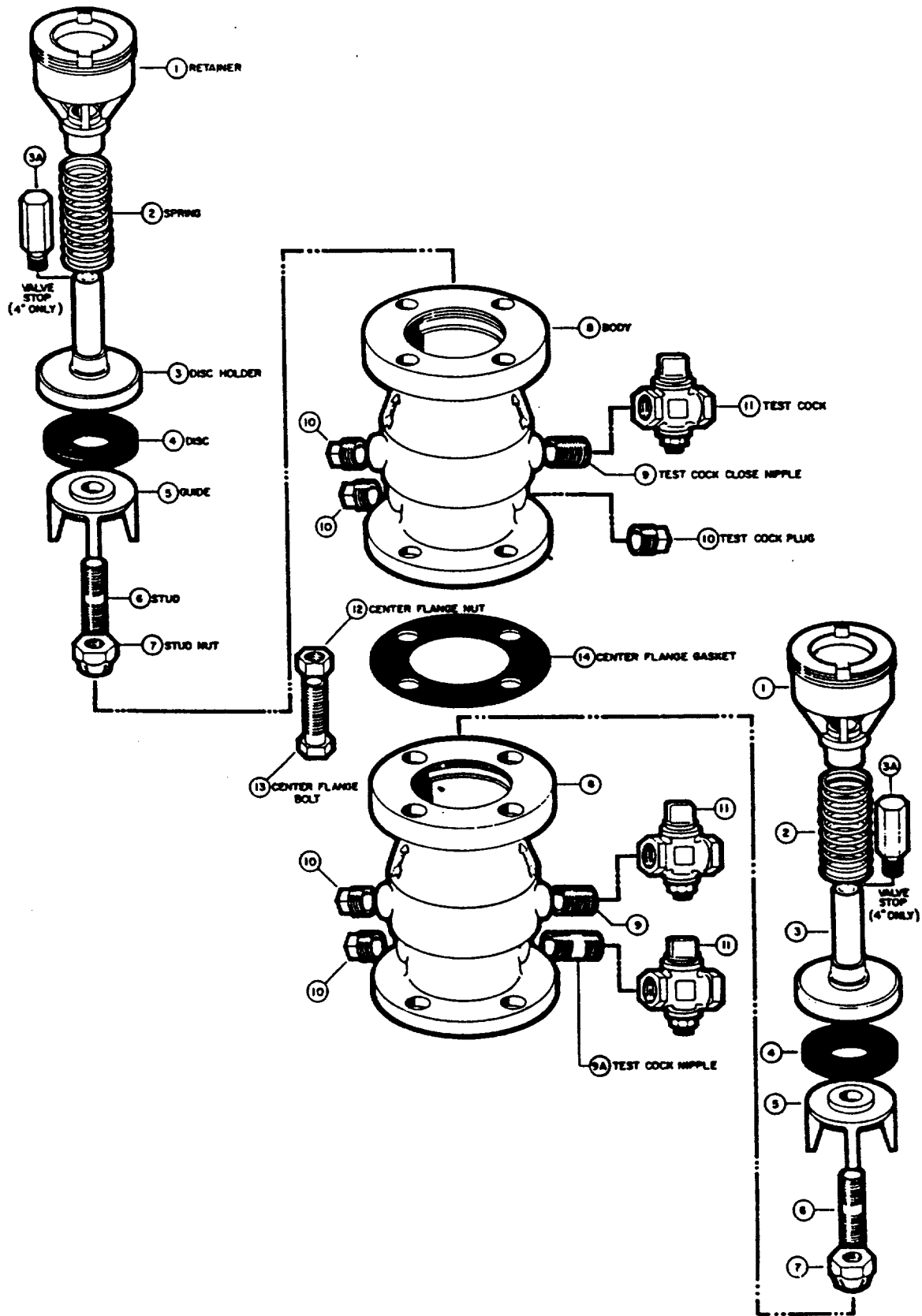


FIGURE 51  
BEECO DOUBLE CHECK VALVE ASSEMBLY (3" AND 4" SIZES)

## REPAIRS — HERSEY NO. 1 CHECK VALVE ASSEMBLY

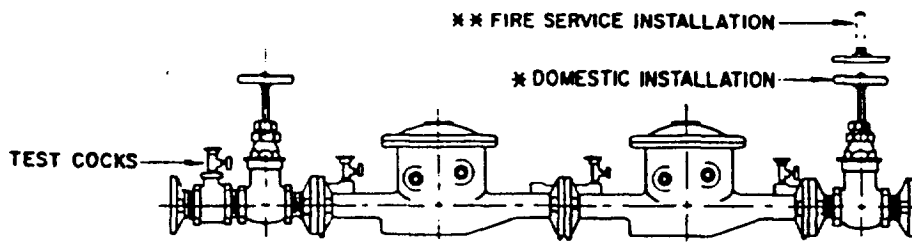
### DISASSEMBLY (see Figs. 52 and 53)

1. Remove top case.
2. Check lever valve mechanism, on smaller sizes, by lifting weight (18) as far as it will go. The swing arm (7) should be lifted until the roller (17) comes in contact with roller path on weight. Allow valve to close slowly to make sure it does not hang up at any point.
3. On larger sizes, lift weight alone. It should move freely and rest against roller at flat of roller path on weight.
4. Remove the weight.
  - a. Remove hinge spindle plugs (9).
  - b. Support weight, either with hands, or larger sizes, with a hoist.
  - c. With bronze driver (or using an old spindle), tap spindle (11) out from one side. When it extends from the bottom case, it can be pulled the rest of the way.  
If corrosion deposits are present, remove with emery cloth to prevent jamming spindle in bushings (10).
5. Lift weight from case. Inspect the rubber bushings (8), bronze case bushings (10), and spindle (11) for wear.
6. On larger sizes, check operation of swing arm (7). It should move freely.
7. Remove swing arm, following procedure outlined above for weight.
8. Check rubber swing arm and roller bushings (8, 16) for wear, as well as the bronze case bushings and spindle.
9. To remove worn case bushings, insert a driver made of bronze or steel from outside case, and drive out of position.
10. Drive new bushings into place from inside case, using a lead hammer or a bronze driver inserted from opposite side (see Fig. 54).
11. Remove worn rubber weight, swing arm and roller bushings with a bronze driver. Use a plastic or lead hammer to install new bushings.

12. The clapper rubber (4) should be resilient and free of any indentation. Remove worn clapper rubbers by disassembling in order the clapper bolt cotter pin (1), clapper bolt nut (2), clapper disc (3), clapper (6), clapper rubber (4), and clapper bolt (13). If the rubber is still resilient and has not been deformed, it can be reversed to lengthen its useful life. Inspect rubber O-ring (5) in the clapper, and replace if defective. Assemble parts in reverse order.
13. To disassemble roller (17), remove pin clips (12) and slide pin (14) to one side. This releases roller and two roller washers (15).
14. To assemble roller, place roller and washers in position, pass pin through washers and roller bushing, and replace pin clips.
15. Check screw seat (19) for looseness, dents and corrosion. If screw seat has been dented or corroded, remove by turning counterclockwise, with chain wrench. Do not use a "prong" wrench, as it may distort the seat.
16. Place graphite grease on new seat gasket (20) and install gasket on threaded end.
17. Screw seat in place and tighten firmly with chain wrench.

### REASSEMBLY

1. Hold swing arm in position.
2. Insert spindle through case and swing arm bushings.
3. Rest weight on swing arm and replace spindle in the same manner.
4. Apply pipe joint compound to spindle plugs, and tighten in place.
5. Install new top case gasket, and replace top case.



2" - ALL BRONZE CASES, 3"-10" ALL IRON CASES.

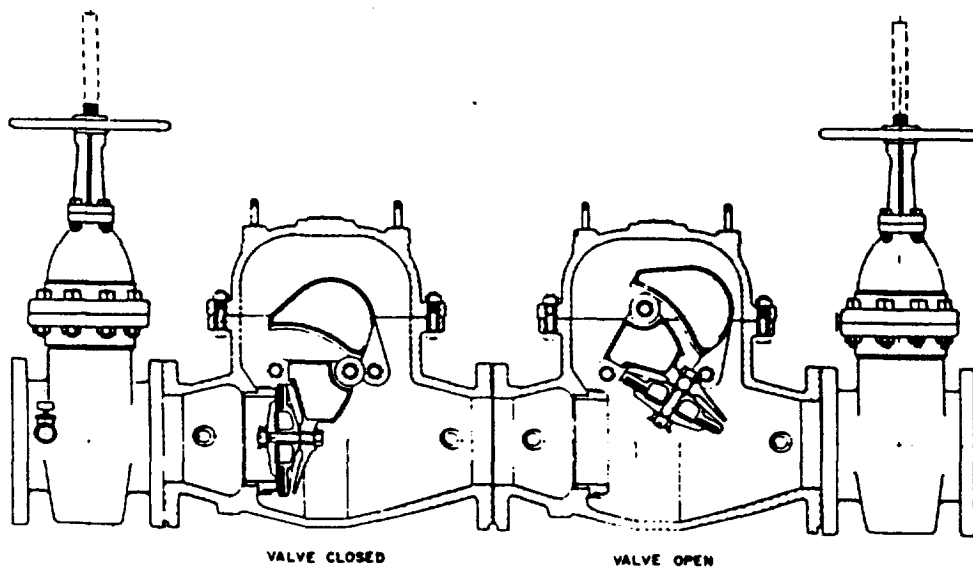
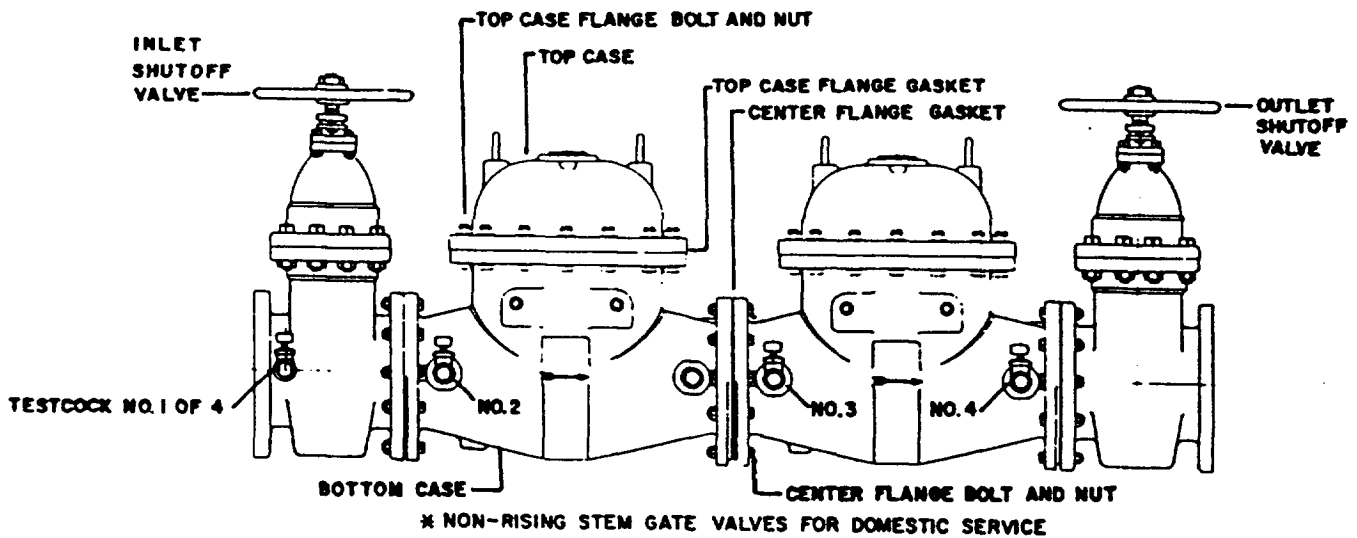


FIGURE 52 \*\* RISING STEM GATE VALVES FOR FIRE SERVICE  
HERSEY NO. 1 DOUBLE CHECK VALVE ASSEMBLY  
(SIZES 2" - 10" x 12")

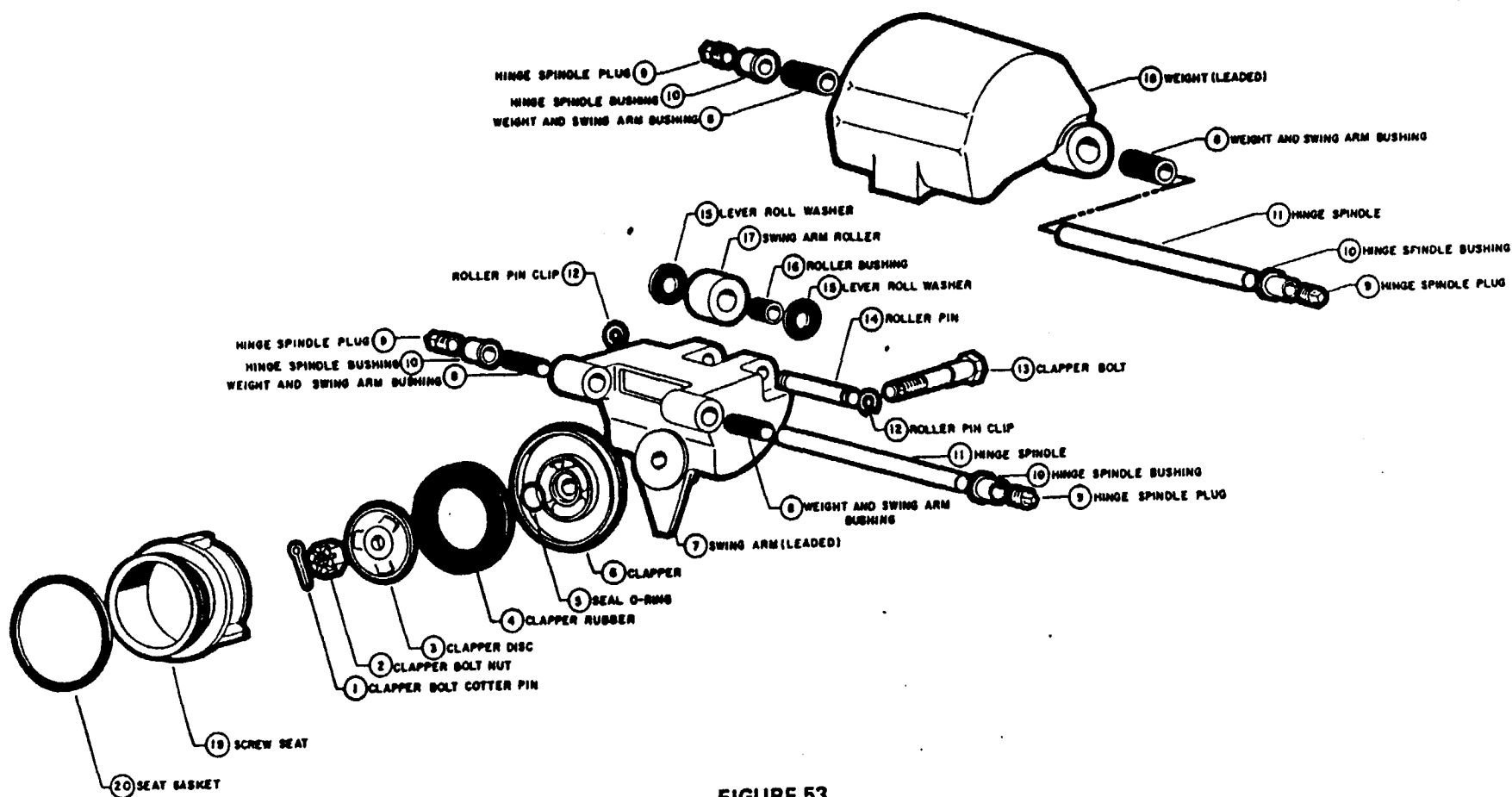
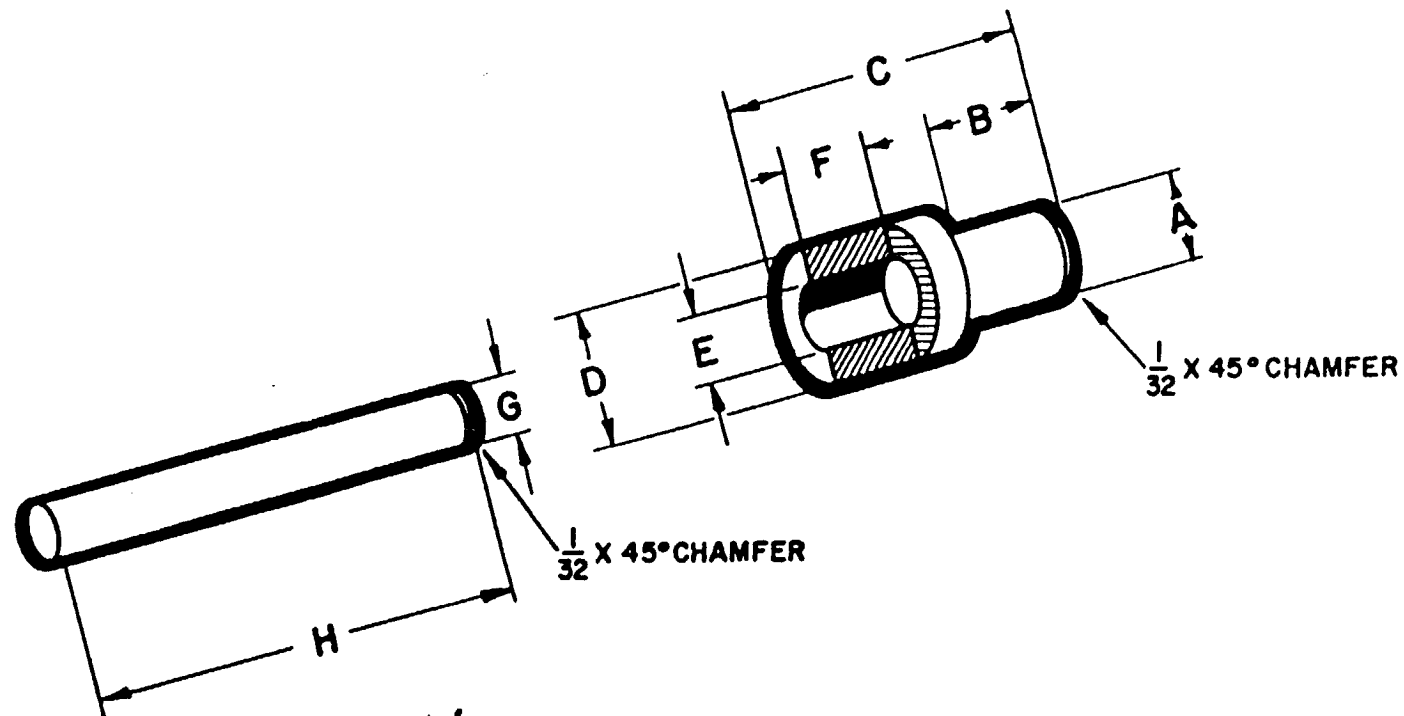


FIGURE 53  
HERSEY NO. 1 CHECK VALVE ASSEMBLY  
(2" - 10" x 12" SIZES)



SIZE"	A	B	C	D	E	F	G	H
2	$\frac{5}{16}$	$\frac{21}{32}$	$1\frac{29}{32}$	$\frac{5}{8}$	$\frac{11}{32}$	$\frac{1}{2}$	$\frac{5}{16}$	$8\frac{1}{2}$
3	$\frac{3}{8}$	$\frac{21}{32}$	$1\frac{29}{32}$	$\frac{5}{8}$	$\frac{11}{32}$	$\frac{1}{2}$	$\frac{5}{16}$	$8\frac{1}{2}$
4	$\frac{15}{32}$	$1\frac{5}{16}$	$2\frac{9}{16}$	1	$\frac{17}{32}$	$\frac{1}{2}$	$\frac{1}{2}$	$11\frac{1}{2}$
6	$\frac{3}{4}$	$1\frac{5}{16}$	$2\frac{9}{16}$	1	$\frac{17}{32}$	$\frac{1}{2}$	$\frac{1}{2}$	$11\frac{1}{2}$
8	$\frac{15}{16}$	$1\frac{7}{8}$	$3\frac{1}{8}$	$1\frac{5}{8}$	$1\frac{11}{32}$	$\frac{1}{2}$	1	17
10	$1\frac{1}{4}$	$1\frac{7}{8}$	$3\frac{1}{8}$	$1\frac{5}{8}$	$1\frac{11}{32}$	$\frac{1}{2}$	1	17

FIGURE 54  
SPINDLE BUSHING DRIVER

## TESTS

### GENERAL COMMENTS

#### 1. REDUCED PRESSURE BACKFLOW PREVENTERS

Reduced Pressure Backflow Preventers should be inspected occasionally for signs of discharge from the relief valve, in order to obtain a "visual indication" of need for maintenance. It is recommended that tests for proper operation of the valves within the unit be made at least once each year, or as prescribed by local authorities having jurisdiction.

Two test methods are commonly used: The compound gauge test method and the differential pressure gauge test method.

The compound gauge test method requires closing both shutoff valves and the spilling of a relatively large amount of water. In addition, the 3/4" Beeco Model 12 device cannot be tested by this method. However, it is a valid test and simple to perform.

The differential pressure gauge method does not require closing the inlet shutoff valve and thus possibly releasing pipe scale and debris into the backflow preventer. In addition, very little time is required to perform the test, and only a slight amount of water is spilled.

#### 2. DOUBLE CHECK VALVE ASSEMBLIES

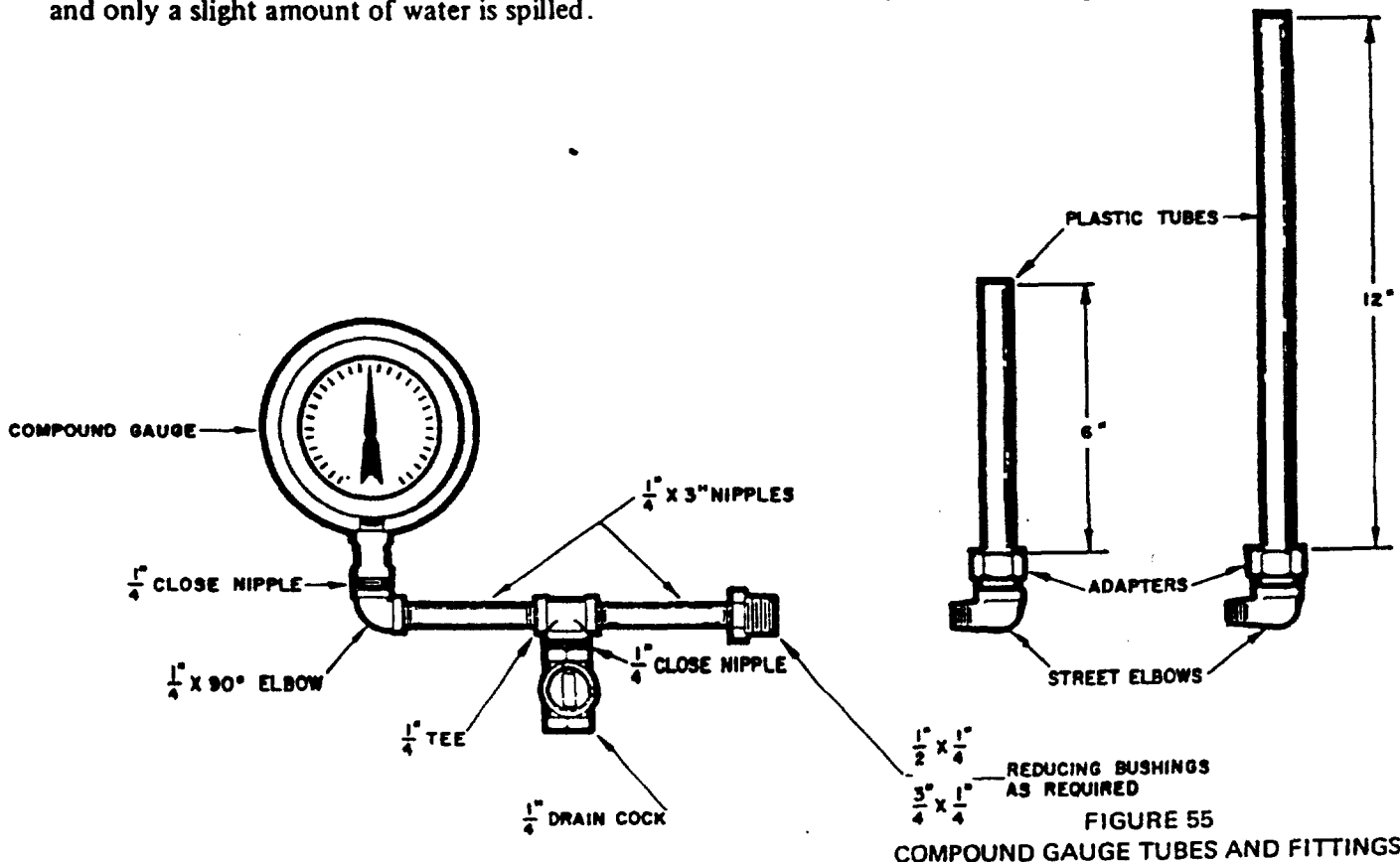
The tube test method is normally used, employing two plastic tubes. In some localities, a test using a single tube may be required by authorities having jurisdiction. In addition, a method using two pressure gauges is available.

All test methods described above are outlined in this manual.

#### COMPOUND GAUGE TEST METHOD BEECO REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS

FIELD TEST EQUIPMENT REQUIRED (see Fig. 55).

Qty.	Description
1 -	Marshalltown (or equivalent) compound gauge, 15 lb - 30"
1 -	Plastic tube 1" O.D. x 3/4" I.D. x 6" long with adapter to 1/2" pipe.
1 -	Plastic tube as above, 12" long.
2 -	1/2" x 1/4" street ells
1 -	Drain line, including
2 -	1/4" brass close nipples
1 -	1/4" brass tee
2 -	1/4" x 3" brass space nipples





- 1 1/4" brass elbow
- 1 1/4" brass drain cock
- 2 1/4" x 1/2" brass bushings (for use in testing 2-1/2" - 4" devices)
- 2 1/4" x 3/4" brass bushings (for use in testing 6" - 10" devices)

In testing 1" - 2" devices, screw street ells directly into test cocks. In testing larger sizes, screw bushings into test cocks, and street ells into bushings.

NOTE: Complete Gauge Method Test Kit may be ordered from Hersey Products

This method is suitable for testing the Model 6C, Model 6, and Model 10 Beeco devices, but cannot be used in testing the 3/4" Beeco Model 12 device. (Use the differential pressure gauge method for the Model 12.)

## TEST PROCEDURE

Install test equipment as shown in Figure 56.

- a. Close shutoff valve No. 2. If relief valve starts to drain, the first check valve is leaking.
- b. Close shutoff valve No. 1.
- c. Open test cock No. 4. To fill the plastic tube, crack open shutoff valve No. 1, until a small amount of water continues to run over the top of the tube.
- d. Open test cock No. 3. Water will then spill over the top of the short tube.
- e. Open test cock No. 2.
- f. Open drain cock slowly until spillage over the top of the short tube stops. Check the gauge reading at this point. This reading is the pressure drop across the first check valve and should be between 6 and 10 psi.
- g. Slowly open the drain cock, thereby causing the gauge pressure to fall.
- h. As the gauge pressure approaches 2 psi, the water column in the short tube will slowly fall, and should fall rapidly just as the relief valve opens. (In valves 6" and larger it may be necessary to refill the tube with a hose.) The gauge reading at this point should not be less than 2 psi.
- i. Open the drain cock wide, causing the relief valve to come wide open.
- j. If the water level in the long tube remains at the top of the tube, the second check valve is tight. If the level falls when the relief valve is open, refill this tube with a hose and maintain the water level at the top of the tube. If the relief valve drains continually, the second check valve is leaking. If there is no drainage from the relief valve, but flow through the hose is required to maintain the water level in the tube, then shutoff valve No. 2 is leaking.

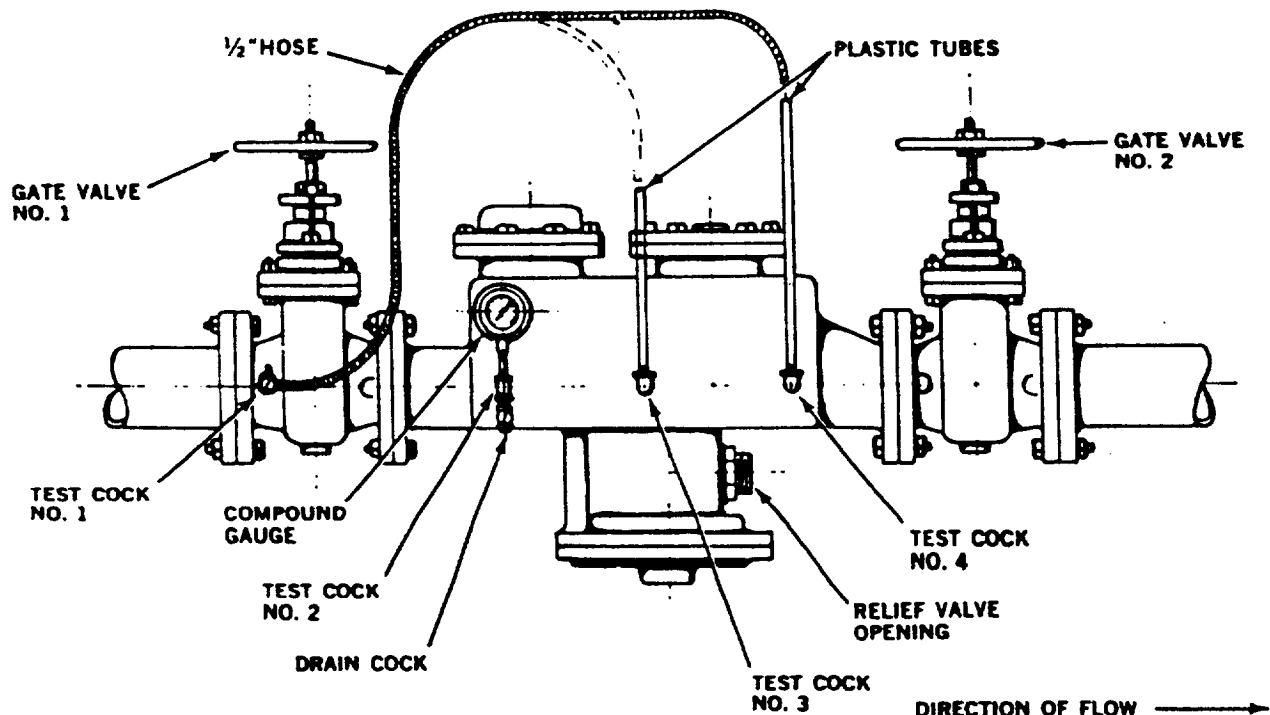


FIGURE 56 COMPOUND GAUGE AND TUBES INSTALLED ON BEECO MODEL 6C DEVICE

# DIFFERENTIAL PRESSURE GAUGE TEST METHOD

## BEECO REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS

### GENERAL

The Beeco Field Test Kit may be ordered from Hersey Sales Offices or Distributors for Field Tests of Beeco Reduced Pressure Principle Backflow Preventers. It includes the following:

ITEM	Quantity
Differential Pressure Indicator (0-15 PSI Range)	1
Nipple — 1/4" NPT x 3"	1
Male Elbow — 1/4" Compression x 1/4" NPT	2
Formed Copper Tube	1
3-Way Manifold Valve	1
Male Elbow — 7/16" - 20 Flared x 1/4" NPT	2
Bleed Fitting — 1/4" NPT Male	2
Pressure Hose — 5 ft.	3
Hose Adapter — 1/4" NPT Male x 1/4" Male, Welding Hose	4
Reducing Bushing — 1/2" Female x 3/4" Male Thread	4
Reducing Bushing — 1/4" Female x 1/2" Male Thread	4

**NOTE:** In testing older 2-1/2 - 4" models, install 1/2" x 1/4" bushings into testcocks, and connect hose adapters to bushings.

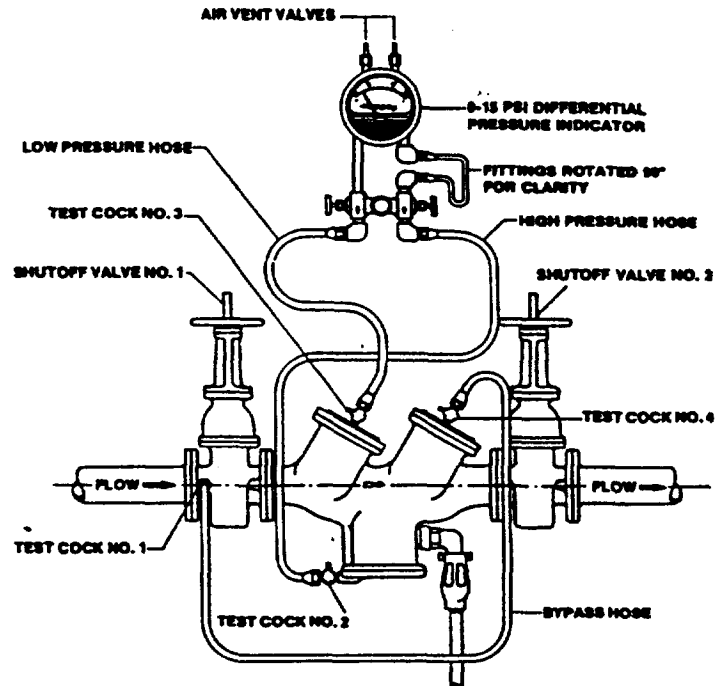
In testing older 6" - 10" devices, install 1/2" x 3/4" bushings in testcocks, 1/4" x 1/2" bushings in 1/2" x 3/4" bushings, and connect hose adapters.

On current models, connect hose adapters directly to testcocks.

### ASSEMBLY OF TEST KIT TO BACKFLOW PREVENTER (see Fig. 57)

1. Connect one hose between elbow connector on high pressure (right) side of manifold and testcock #2 (adjacent to relief valve).
2. Attach second hose to elbow connector on low pressure (left) side of manifold and testcock #3—located on cover of first check on main valve.
3. Attach third hose between testcock #1 on first gate valve, and testcock #4 on cover of second check valve.

### DIFFERENTIAL PRESSURE GAUGE PART NO. 62390



**FIGURE 57**  
**DIFFERENTIAL PRESSURE GAUGE**  
**INSTALLED ON BEECO 6CM DEVICE**

### TEST PROCEDURES

- A. To determine the static pressure drop across the first check valve. Requirement: The first check valve shall maintain a static pressure drop of at least 5 PSI.
  1. Close shutoff valve #2.
  2. Close all three valves on manifold valve.
  3. Open testcocks #2 and #3 at hose ends located at relief valve.
  4. Open both bleed fittings using a 9/16" open end wrench. Slowly open all three valves until water leaves both bleed fittings, thus indicating the gauge is filled. Close both bleed fittings and drain remaining water.
  5. Close the left, low pressure valve. This will apply the higher pressure equally to both sides of the diaphragm. Turn the zero adjust screw at bottom of gauge cover until the pointer is exactly at zero.
  6. Close the center equalizer valve and open the left, low pressure valve. The gauge will now be indicating differential pressure.

7. Open testcock #4 on second check valve and drain a small amount of water to re-establish pressure conditions in the device.
  8. Close testcock #4 and note differential pressure reading on gauge. A reading of 5 PSI to about 8 PSI is normal.
- B. To test operation of Differential Pressure Relief Valve. Requirement: The differential pressure relief valve must operate to maintain the zone between the two check valves at least 2 PSI less than the supply pressure.
1. Open the center equalizer valve until the gauge reading starts to fall. Note the differential pressure reading on the gauge when the relief valve starts to drip. The gauge reading must be at least 2 PSI.
  2. Close center equalizer valve.
- C. To test the second check valve for tightness against reverse flow. Requirement: The check valve must be tight against reverse flows under all pressure differentials.
1. Open shutoff valve #2 slightly to re-establish normal pressure conditions in the unit. Close valve.
  2. Open testcocks #1 and #4. If the gauge reading falls off, the second check valve is leaking. The relief valve will eventually drip if the second check valve is leaking.

## TEST CONCLUSION

1. Close testcocks.
2. Remove hose from testcocks #1 and #4 (back off first nut slowly to release water pressure in hose).
3. Open bleed fittings to release water pressure in gauge. Close fittings.
4. Remove hoses from testcocks #2 and #3, and manifold.

## TUBE TEST METHOD (see Fig. 58)

### HERSEY AND BEECO DOUBLE CHECK VALVE ASSEMBLIES.

### FIELD TEST EQUIPMENT REQUIRED (using 6" and 12" tubes)

Qty.	Description
1	Plastic tube 1" O.D. x 3/4" I.D. x 6" long with adapter to 1/2" pipe.
1	Plastic tube, as above, 12" long
2	1/2" x 1/4" street ells
2	1/4" x 1/2" brass bushings (for use in testing 3" and 4" check valve assemblies)
2	1/4" x 3/4" brass bushings (for use in testing 6", 8" and 10" check valve assemblies)

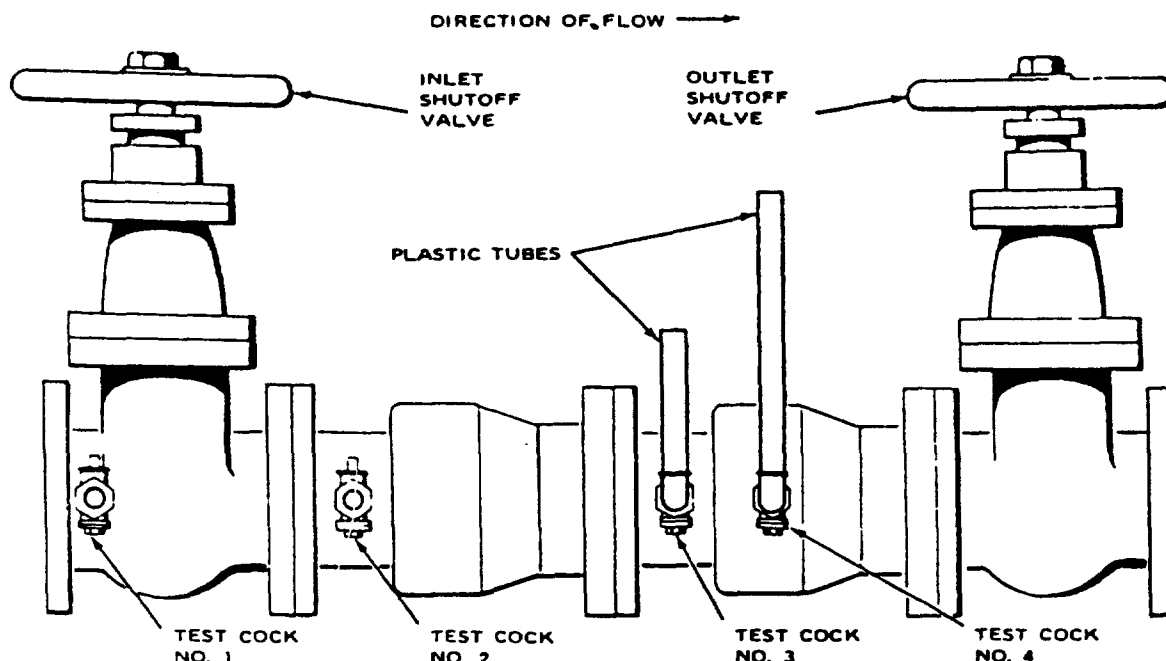


FIGURE 58  
TUBES INSTALLED ON BEECO 3" DOUBLE CHECK VALVE ASSEMBLY

## FIELD TEST EQUIPMENT REQUIRED (using 30" tube)

This test may be required by authorities having jurisdiction.

Qty.	Description
1	Plastic tube 1" O.D. x 3/4" I.D. x 30" long with adapter to 1/2" pipe
1	1/2" x 1/4" street ell
1	1/4" x 1/2" brass bushing
1	1/4" x 3/4" brass bushing

NOTE: Complete tube method test kit for double check valve assemblies may be ordered from Hersey Products Inc.

### INSTALLATION OF TUBES — BEECO DOUBLE CHECK VALVE ASSEMBLIES

#### A. 2" CHECK VALVE ASSEMBLY

Screw street ells into test cocks No. 3 and 4. Connect plastic tubes to street ells.

#### B. 3" AND 4" CHECK VALVE ASSEMBLIES

Install 1/4" x 1/2" bushings in test cocks No. 3 and 4. Screw street ells into bushings. Connect plastic tubes to street ells.

#### C. TEST USING 30" TUBE

If test using 30" tube is required by local authorities, install 30" tube on test cock No. 3. Do not use either 6" or 12" tube.

### INSTALLATION OF TUBES — HERSEY NO. 1 DOUBLE CHECK VALVE ASSEMBLIES

#### A. 2" CHECK VALVE ASSEMBLY

Screw street ells into test cocks No. 3 and 4. Connect plastic tubes to street ells.

#### B. 3" AND 4" ASSEMBLIES

Screw 1/4" x 1/2" bushings into test cocks No. 3 and 4. Screw street ells into bushings. Connect plastic tubes to street ells.

#### C. 6", 8" AND 10" ASSEMBLIES

Screw 1/4" x 3/4" busings into test cocks No. 3 and 4. Screw street ells into bushings. Connect plastic tubes to street ells.

#### D. TEST USING 30" TUBE

If test using 30" tube is required by local authorities, install 30" tube on test cock No. 3. Do not use either 6" or 12" tube.

### TEST PROCEDURE — USING 6" AND 12" TUBES

- a. Close shutoff valve No. 2.
- b. Open test cocks No. 3 and No. 4 only enough to fill tubes and permit a small amount of water to flow over the top of each tube.
- c. Close shutoff valve No. 1.
- d. Fully open test cocks No. 4, No. 3, No. 2, in that order.
- e. When both shutoff valves are tightly closed:
  1. If both tubes stand full of water, both check valves are closed tight.
  2. If water in short tube at test cock No. 3 falls and drains from test cock No. 2, the first check valve is leaking.
  3. If water in short tube at test cock No. 3 overflows accompanied by falling of the water level in the long tube at test cock No. 4, the second check valve is leaking.
  4. If water in both tubes falls and drains from test cock No. 2, both check valves are leaking.
- f. The following steps (g, h, i, and j), are used to accurately determine the condition of the check valves when either or both shutoff valves leak a moderate amount. (When either shutoff valve leaks an amount that is beyond the capacity of the test cock to drain without a buildup of pressure, the shutoff valve should be repaired before proceeding with the test.)
- g. When shutoff valve No. 1 only leaks:
  1. Water will drain continually from test cock No. 2.
  2. Tightness of check valves is determined in the same way as in (e) above.
- h. When shutoff valve No. 2 only leaks:
  1. If there is pressure on the downstream side of shutoff valve No. 2, some overflow may occur at test cock No. 4. Tightness of check valves is determined in the same way as in (e) above

2. If there is no pressure on the downstream side of shutoff valve No. 2, water in the long tube at test cock No. 4 may fall, in which case a hose connected at test cock No. 1 should be used to keep the long tube filled. Tightness of check valves is determined in the same way as in (e) above.
- i. When both shutoff valves leak, water will drain continually from test cock No. 2, and water in the long tube at test cock No. 4 will overflow or fall depending upon pressure conditions on downstream side of shutoff valve No. 2. Tightness of check valves is determined in the same way as in (e) and (h) above.

### TEST PROCEDURE – USING 30" TUBE

#### Purpose:

To test No. 2 check valve for proper internal loading.

#### Requirement:

Valve shall be drip-tight in the normal direction of flow with the inlet pressure at 1 psi and the outlet pressure at atmospheric.

#### Steps:

- a. Install a vertical transparent tube on test cock No. 3. Open test cock No. 3 to fill the tube with water to a height of 27-3/4 inches (min.) above the center line of the valve. Close test cock No. 3.
- b. Close shut-off valve No. 2, then close shut-off valve No. 1.
- c. Open test cock No. 3 fully. Open test cock No. 4 fully. If the level of water in the tube holds steady at a height of 27-3/4 inches or more above the center line of the check valve, the check valve shall be noted as "satisfactory".
- d. Close test cocks No. 3 and No. 4 and remove the tube.

### TEST No. 2

#### Purpose:

To test No. 1 check valve for proper internal loading.

#### Requirement:

Valve shall be drip-tight in the normal direction of flow with the inlet pressure at 1 psi and the outlet pressure at atmospheric.

#### Steps:

- a. Install a vertical transparent tube on test cock No. 2. Open test cock No. 2.
- b. Open shut-off valve No. 1 until the tube is filled with water to a height of 27-3/4 inches (min.) above the center line of the valve. Then close the No. 1 shut-off valve.
- c. Open test cock No. 3. If the level of water holds steady at a height of 27-3/4 inches or more above the center line of the check valve, the check valve shall be noted as "satisfactory".

### HERSEY NO. 1 DOUBLE CHECK VALVE ASSEMBLY

PRESSURE GAUGE TEST METHOD (see Figs. 59 and 60).

### TEST EQUIPMENT AND PROCEDURES.

Recommended test equipment and test procedure is outlined below. The test equipment illustrated consists of the following:

Qty.	Description
2	- Pressure gauges, of good quality – 2" dial or larger, 0-150 psi range
3	- 6-ft. lengths rubber hose with 1/4" water-tight screw couplings. (1/4" i.d. welding hose is suggested).
2	- 1/4" level handle brass gauge cocks, double female
2	- 1/4" standard brass tees
2	- 1/4" brass close nipples
6	- 1/4" I.P. thread to welding hose thread brass couplings (sometimes called regulator outlet fittings).
	3/8" plywood board for mounting gauges.
3	- 1/4" x 1/2" bushings (for use in testing 3" and 4" check valve assemblies)
3	- 1/4" x 3/4" bushings (for use in testing 6", 8" and 10" devices)

In testing 3" and 4" check valve assemblies, install 1/4" x 1/2" bushings in test cocks No. 1, 3, and 4. In testing 6", 8", and 10" assemblies, install 1/4" x 3/4" bushings in testcocks.

## TEST NO. 1

### Purpose:

To test No. 1 check valve for tightness against reverse flow.

### Requirement:

Valve must be tight against reverse flow under all pressure differentials.

### Steps:

1. Close shutoff valve No. 2.
2. Install pressure gauges and control cocks (closed) at test cocks No. 2 and No. 3.
3. Open test cocks No. 2 and 3. Close No. 1 shutoff valve.

4. Drain *slowly* from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. Close control cock. If both gauges hold the established differential pressure for at least one minute, the check shall be noted in the report as "Closed Tight".

If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 2 in the attempt to establish the one-pound differential. Confirm by the following procedure:

- a. Open shutoff valve No. 1 and re-establish pressure in the device.
- b. Install bypass hose between No. 1 and No. 3 test cocks, thus feeding line pressure downstream of check valve.
- c. Close shutoff valve No. 1. Drain slowly from control cock at test cock No. 2 until gauge at test cock No. 2 reads 1 psi less than gauge at test cock No. 3. If water runs continuously from control cock, the check shall be noted as "Leaked".

## TEST NO. 2

### Purpose:

To test No. 2 check valve for tightness against reverse flow.

### Requirement:

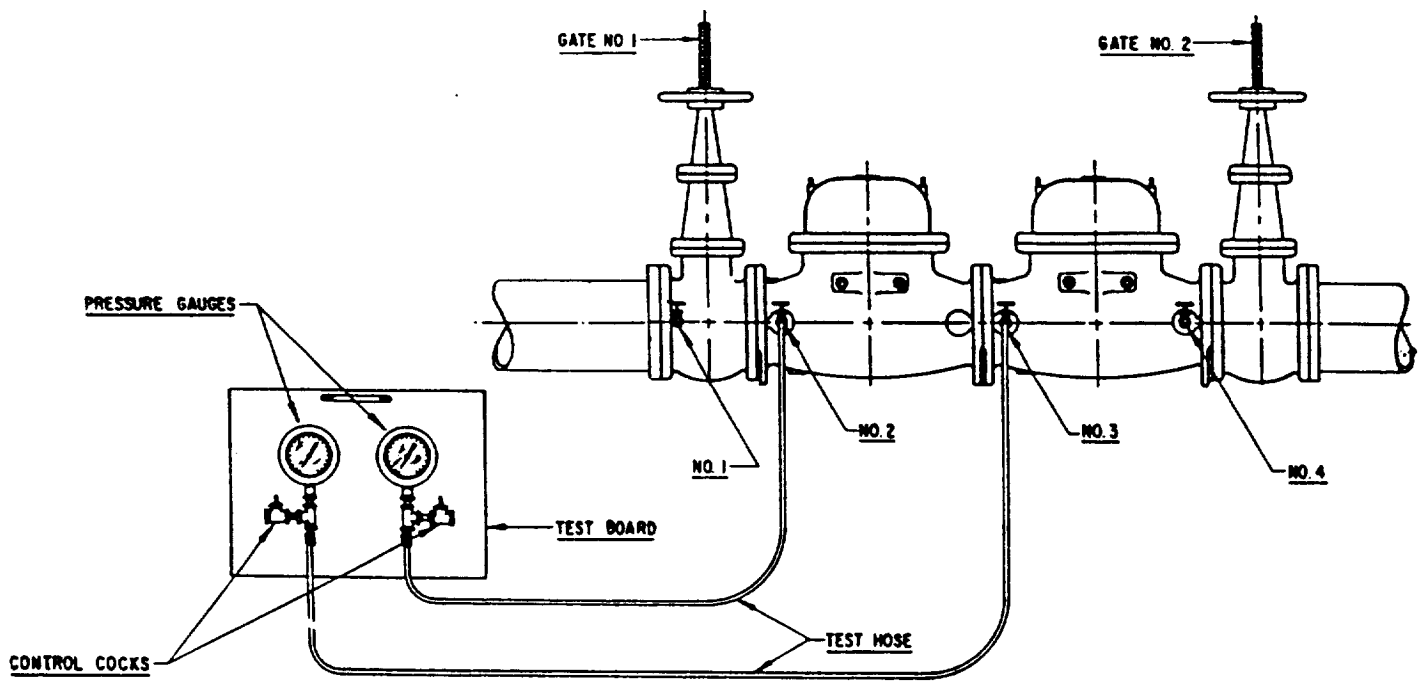
Valve must be tight against reverse flow under all pressure differentials.

### Steps:

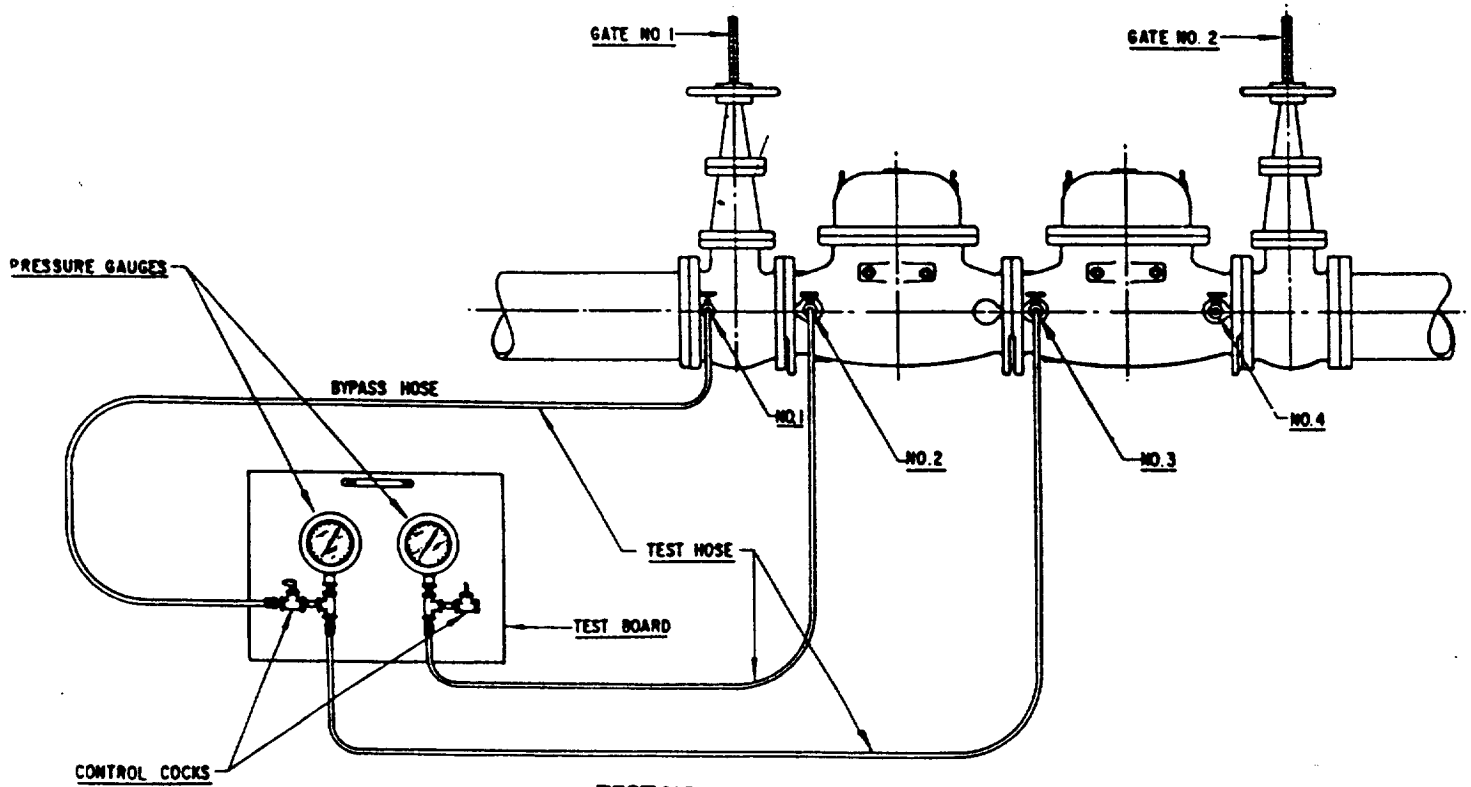
1. Open No. 1 shutoff valve and re-establish pressure in the device.
2. Install pressure gauges and control cocks at test cocks No. 3 and No. 4.
3. Open test cocks No. 3 and No. 4. Close No. 1 shutoff valve.

4. Drain *slowly* from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. Close control cock. If both gauges hold the established differential for at least one minute, the check shall be noted as "Closed Tight." If the check valve leaks, both gauges will drop simultaneously while water is being drained from control cock at test cock No. 3 in the attempt to establish the one-pound differential. Confirm by the following procedure:

- a. Open No. 1 shutoff valve and re-establish pressure in the device.
- b. Install bypass hose between No. 1 and No. 4 test cocks, thus feeding line pressure downstream of check valve.
- c. Close No. 1 shutoff valve. Drain slowly from control cock at test cock No. 3 until gauge at test cock No. 3 reads 1 psi less than gauge at test cock No. 4. If water runs continuously from control cock, the check shall be noted as "Leaked".
- d. Remove all equipment and return shutoff valves to original setting.

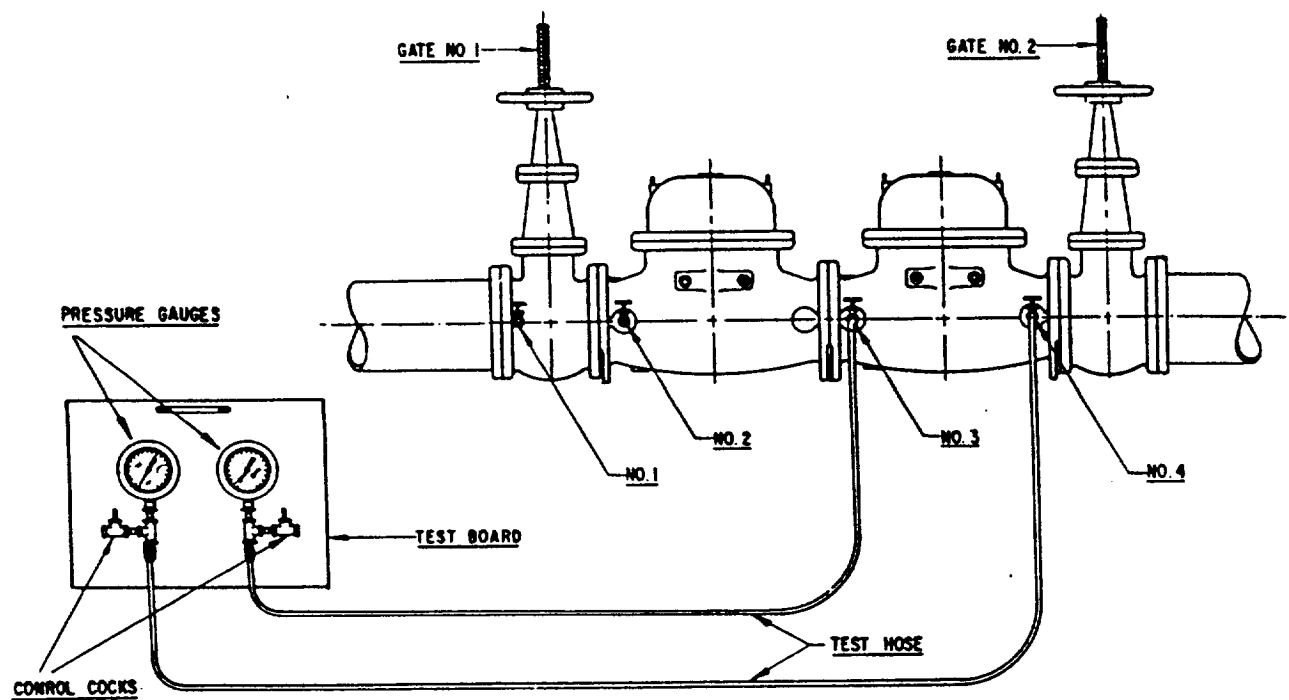


TEST NO. 1 - "STEP B"

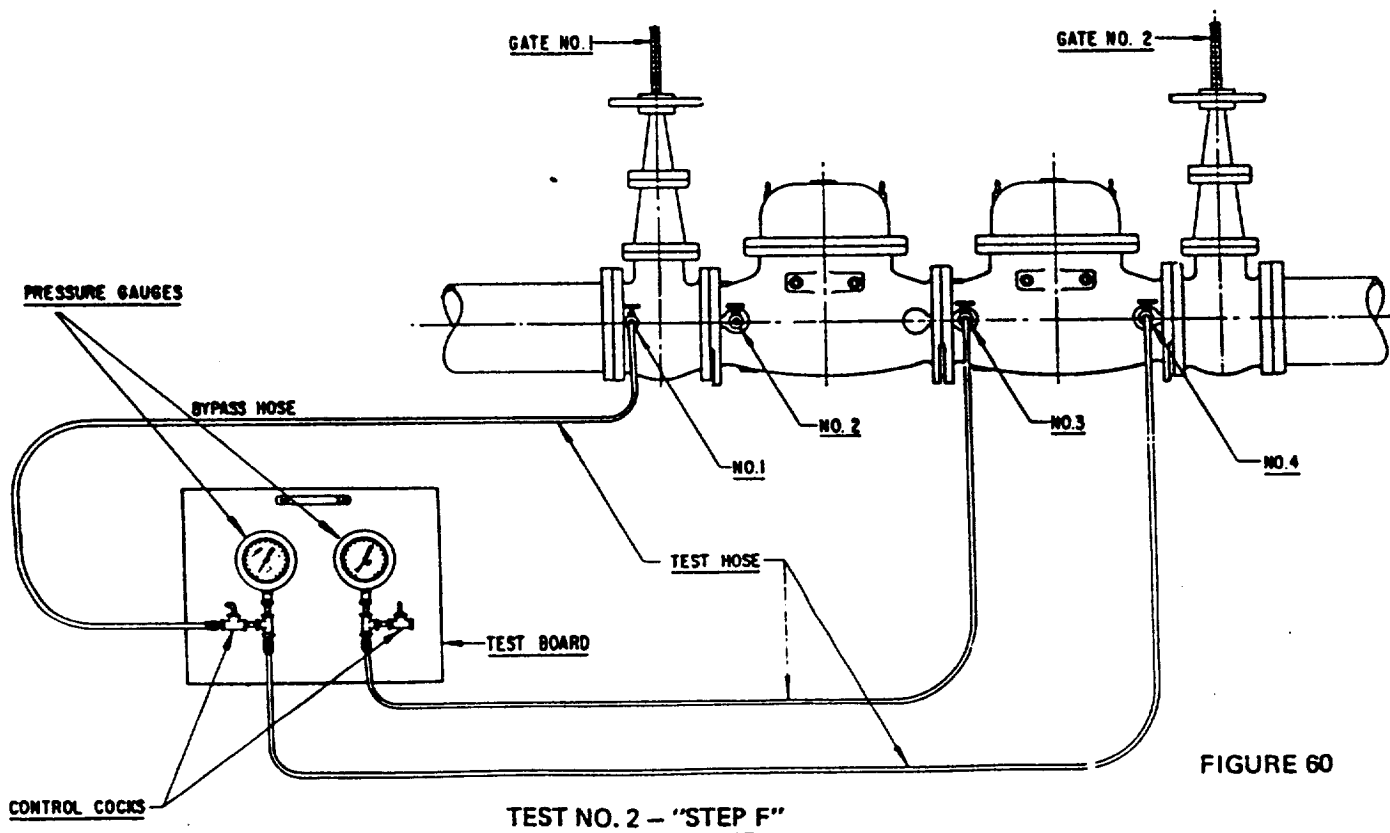


TEST NO. 1 - "STEP F"

FIGURE 59  
PRESSURE GAUGES INSTALLED ON HERSEY NO. 1 DOUBLE  
CHECK VALVE ASSEMBLY (TEST NO. 1)



TEST NO. 2 - "STEP B"



TEST NO. 2 - "STEP F"

FIGURE 60

FIGURE 60  
PRESSURE GAUGES INSTALLED ON HERSEY NO. 1 DOUBLE  
CHECK VALVE ASSEMBLY (TEST NO. 2)

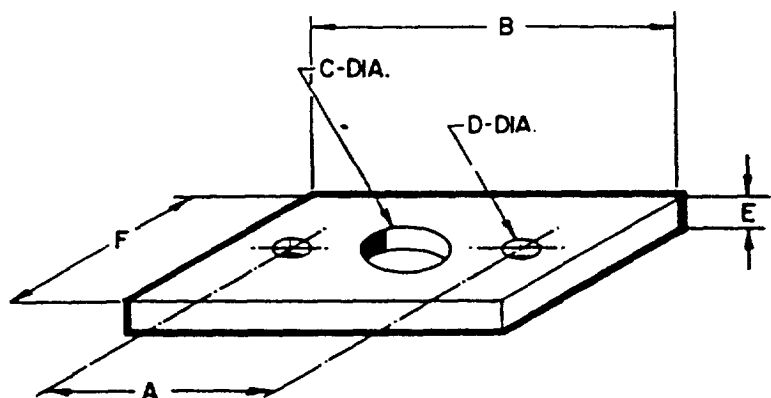


## MODEL 6C MAIN VALVE SPRING REMOVAL TOOL

Part No.	Size Device	Plate Dimensions						Rod Dimensions		Threads/ Inch
		A	B	C	D	E	F	Dia.	Length	
62361	3"	6 1/4"	8 1/4"	1 3/4"	5/8"	1/2"	4"	1/2"	14"	13
62362	4"	7 1/4"	9 1/4"	2"	5/8"	1/2"	4"	1/2"	19"	13
62363	6"	12 1/2"	14 1/2"	2"	7/8"	1/2"	6"	3/4"	23"	14
62364	8"	17"	19"	2"	7/8"	1/2"	6"	3/4"	26"	14
62365	10"	18 3/4"	20 3/4"	2 1/2"	7/8"	1/2"	6"	3/4"	34"	14

### Washer and Nut Specifications:

Use commercially-available steel nuts and washers corresponding to rod diameter and thread.



This tool consists of a steel plate, 2 threaded steel rods and 3 nuts and washers for each rod. Parts may be obtained locally, or a complete set can be ordered from the Hersey Products Inc.

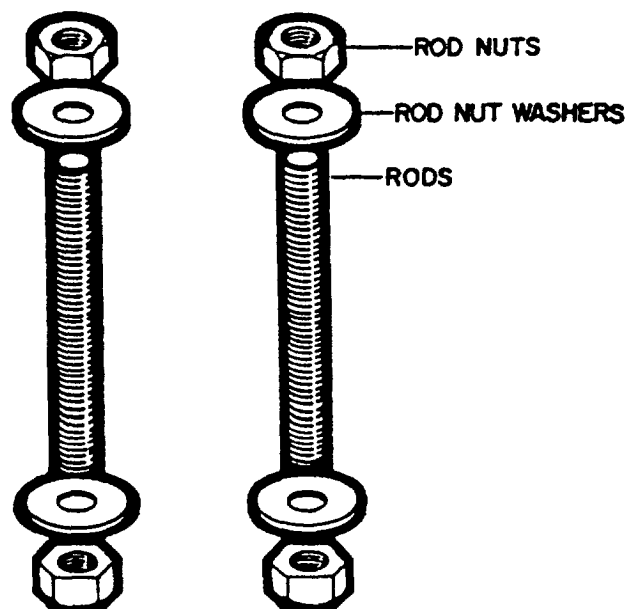


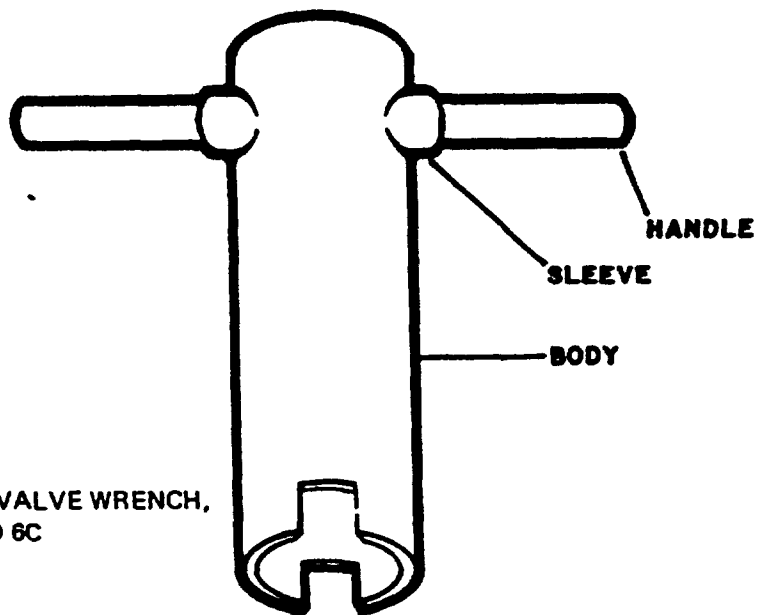
FIGURE 61  
MAIN VALVE SPRING REMOVAL TOOL, BEECO MODEL 6C  
(3" - 10" SIZES)

**SPECIAL MAIN, CHECK AND RELIEF VALVE WRENCHES  
MODELS 6 AND 6C**

**A. Model 6**

<u>No.</u>	<u>Description</u>	<u>Application</u>	<u>Part No.</u>
1.	Main and check valve wrench	2" device	61264
2.	Main and check valve wrench	2 1/2" device	61265
3.	Main and check valve wrench	3" device	61266
4.	Main and check valve wrench	4" device	61267
5.	Main valve wrench	6" device	61777
6.	Check valve wrench	6" device	61776
7.	Relief valve wrench Upper and Lower Seat	2", 2 1/2", 3" device	61260 61261
8.	Relief valve wrench Upper Seat	4", 6", 8", 10" device	61262
9.	Relief valve wrench Lower Seat	4", 6", 8", 10" devices	61263

On 8" and 10" devices, special main and check valve wrenches are not required.



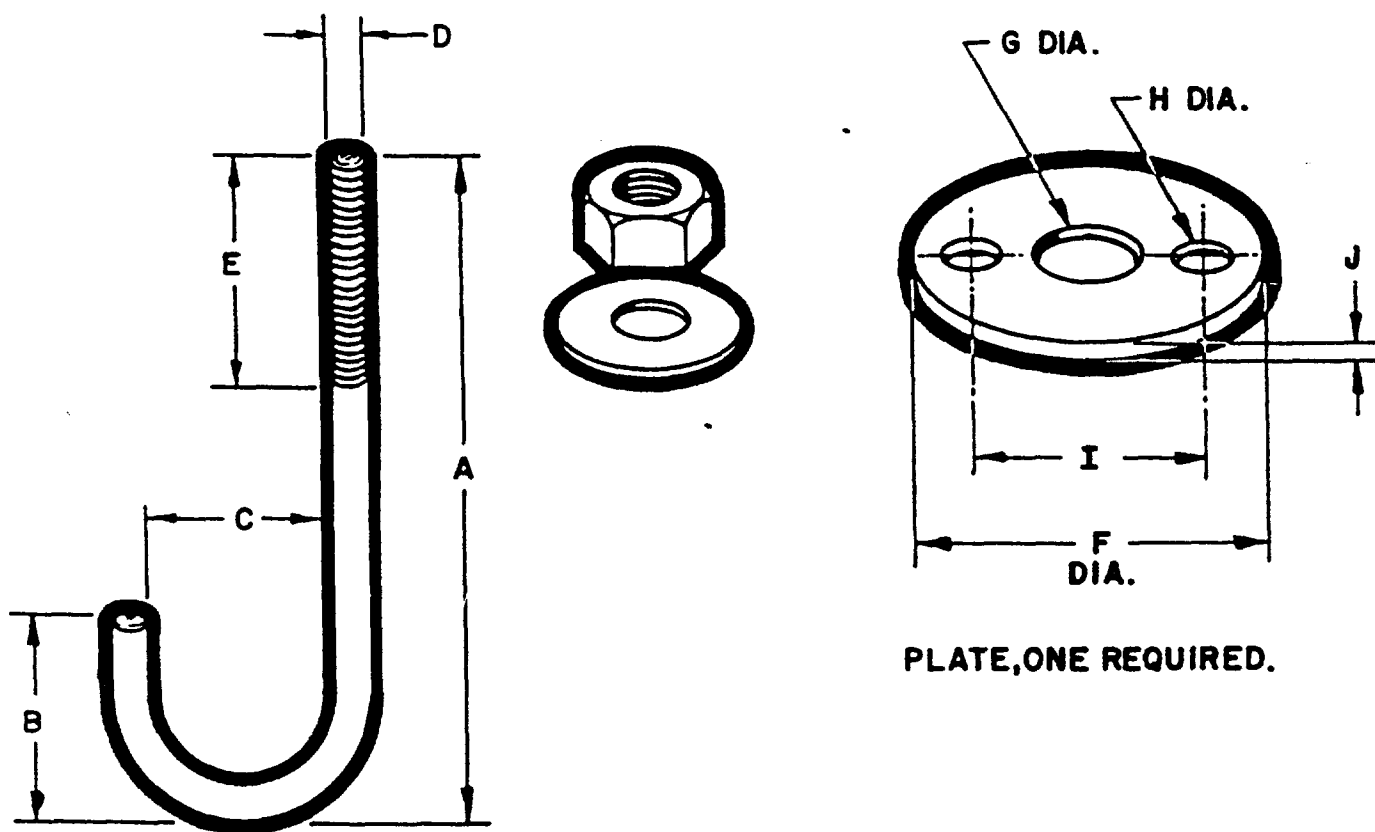
**FIGURE 62  
MAIN, CHECK AND RELIEF VALVE WRENCH,  
MODELS 6 AND 6C**

**B. Model 6C**

<u>No.</u>	<u>Description</u>	<u>Application</u>	<u>Part No.</u>
1.	Relief Valve Wrench Upper Seat	8", 10" devices	61262
2.	Relief Valve Wrench Lower Seat	8", 10" devices	61263

# MODEL 6 MAIN AND CHECK VALVE SPRING REMOVAL TOOL (2" – 6" SIZES)

Part No.	Size Device	Rod Dimensions						Plate Dimensions			Rods Threads/i:	
		A	B	C	D	E	F	G	H	I	J	
62369	2"	14"	1/2"	7/16"	3/8"	7"	3"	1 1/8"	1/2"	2"	1/4"	16
62370	2 1/2"	12"	1/2"	3/8"	3/8"	5"	3 1/2"	1 1/8"	1/2"	2 3/8"	1/4"	16
62371	3"	12"	5/8"	3/8"	3/8"	5"	4"	1 5/8"	1/2"	2 5/8"	1/4"	16
62372	4"	20"	1"	1/2"	1/2"	9"	5 1/2"	2"	5/8"	3 1/2"	3/8"	13
62373	6"	26"	1"	1/2"	1/2"	12"	7 1/2"	2"	5/8"	5 3/4"	3/8"	13



THREADED HOOK ROD WITH  
NUT & WASHER, TWO REQUIRED.

FIGURE 63  
MAIN AND CHECK VALVE SPRING REMOVAL TOOL, MODEL 6  
(2" TO 6" SIZES)

### MODEL 6 MAIN AND CHECK VALVE SPRING REMOVAL TOOL (8" AND 10" SIZES)

Part No.	Rod Dimensions	Washer Dimensions
62366	A - 1 1/2"	A - 1 1/16"
	B - 24"	B - 2 1/2"
	C - 1"	

This tool consists of a threaded steel rod, rod nut and washer. "Flats" (see dimension A) are machined on the rod to accommodate a wrench. Parts may be obtained locally, or a complete set can be ordered from the Hersey Products Inc.

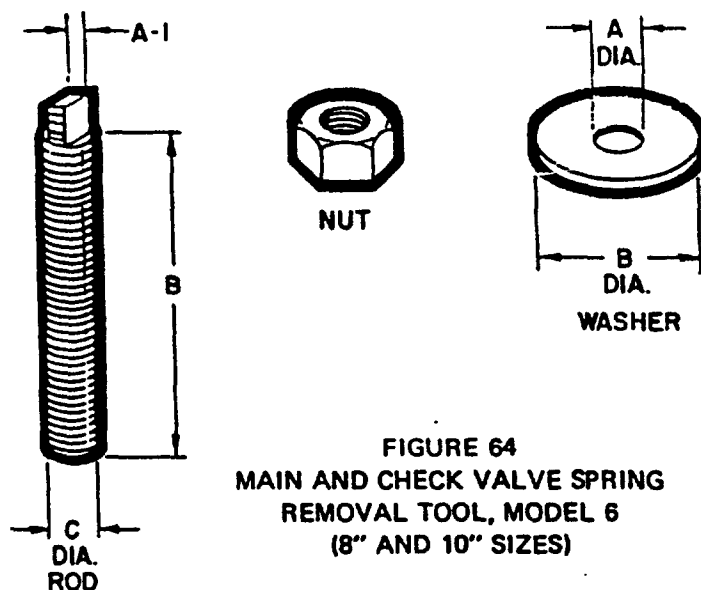


FIGURE 64  
MAIN AND CHECK VALVE SPRING  
REMOVAL TOOL, MODEL 6  
(8" AND 10" SIZES)

### MODEL 6 RELIEF VALVE SPRING REMOVAL TOOL (2" - 6" SIZES)

Part No.	Size Device	Rod Dimensions			Pipe Plug Bushings Dimensions	
		A	B	C	A	B
62367	2", 2 1/2", 3"	1/4"	24"	1/2"	5/8"	2"
62368	4", 6"	1/2"	24"	3/4"	7/8"	3"

Size Device	Thread
2", 2 1/2", 3"	1/2" - 13 NC
4", 6"	3/4" - 10 NC

This tool consists of a threaded steel rod, rod nut and pipe plug bushing. "Flats" (see dimension A) are machined on the rod to accommodate a wrench.

Parts may be obtained locally, or a complete set may be ordered from the Hersey Products Inc.

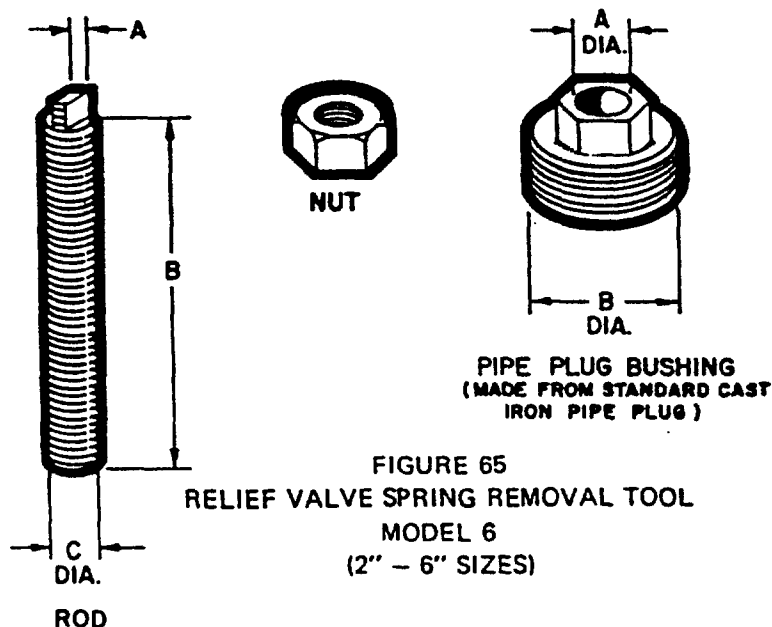


FIGURE 65  
RELIEF VALVE SPRING REMOVAL TOOL  
MODEL 6  
(2" - 6" SIZES)

# 1" MODEL 10 MAIN VALVE SPRING REMOVAL TOOL

This tool consists of a steel plate, two threaded steel rods; and one nut and washer for each rod. Parts may be obtained locally, or a complete set can be ordered from the Hersey Products Meter Company. (Part No. 62374.) See Figure 66 for specifications.

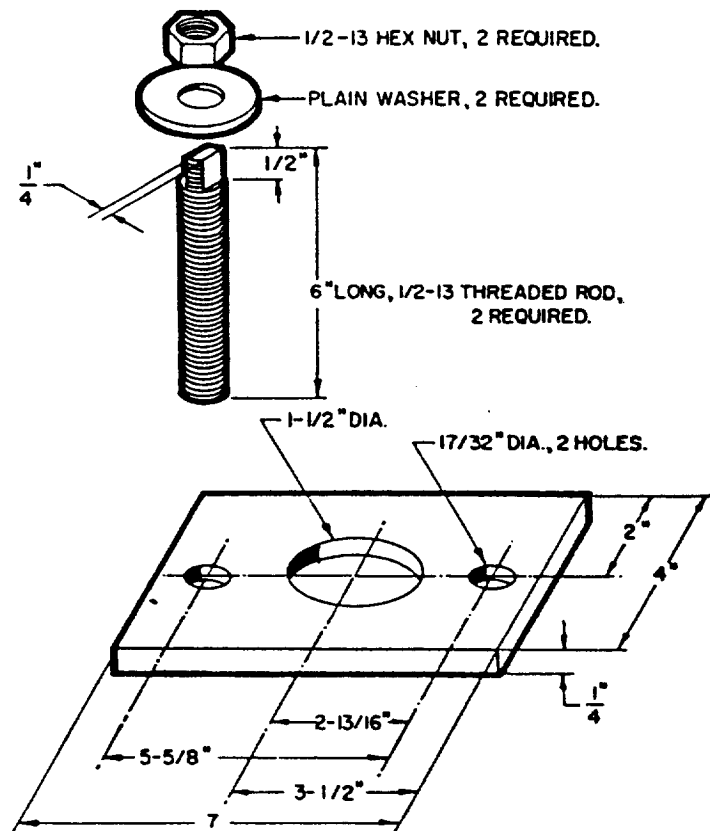
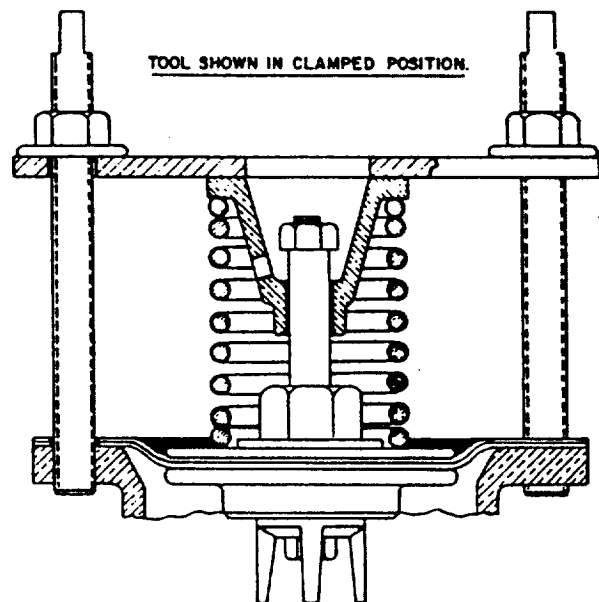
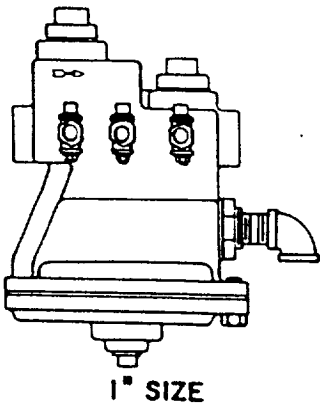
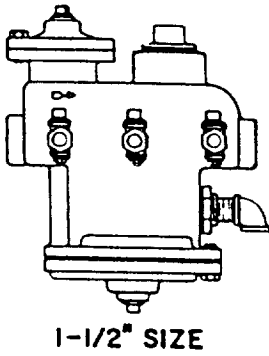


FIGURE 66  
MAIN VALVE  
SPRING REMOVAL TOOL  
1" MODEL 10

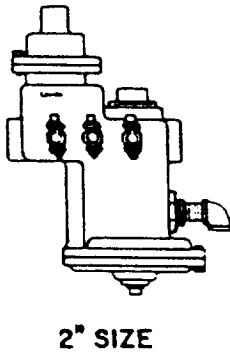




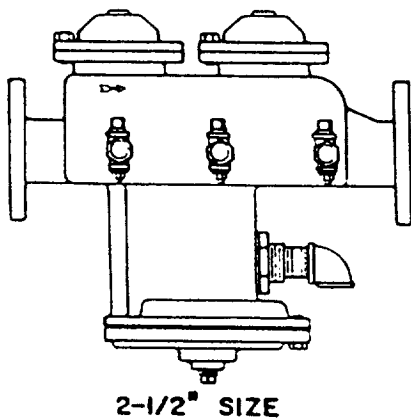
1" SIZE



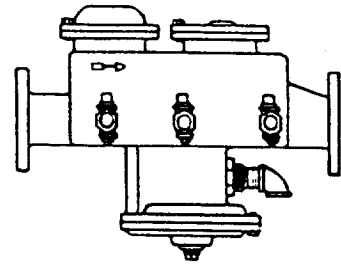
1-1/2" SIZE



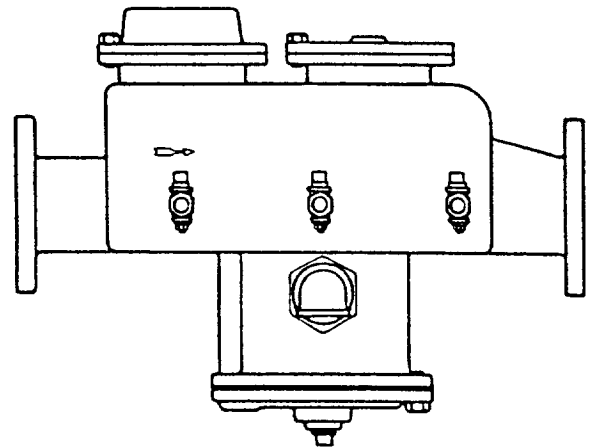
2" SIZE



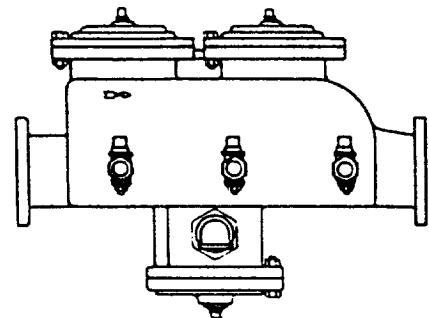
2-1/2" SIZE



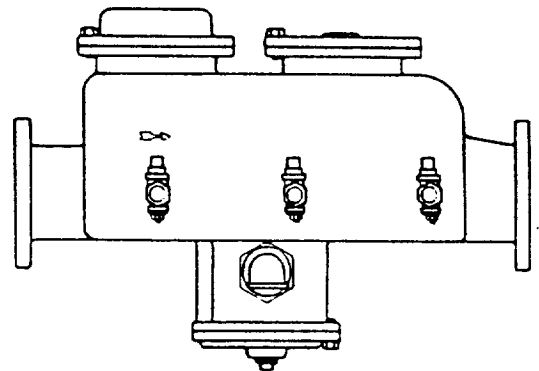
3" SIZE



4" SIZE



6" SIZE (IRON BODY)



6" SIZE (BRONZE BODY)

FIGURE 67  
MODEL 6C REDUCED PRESSURE  
PRINCIPLE BACKFLOW PREVENTERS  
(EXTERIOR VIEWS)



Division of CMB Industries

**OPERATIONS &  
MAINTENANCE  
M A N U A L**



**Reduced  
Pressure  
Backflow  
Prevention  
Assemblies**

**Models**

**825Y, 825YA**

**825, 825D, 825YD,  
& 826YD**

**BACKFLOW PREVENTION SUPPLY**  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

**FEBCO Division of CMB Industries**  
P.O. Box 8070  
Fresno, CA 93747

## **WARRANTY**

All products (manufactured and) sold by CMB Industries are subject to the following warranty: CMB Industries warrants all products manufactured by it will be free from defects in workmanship and material for a period of one (1) year from the date of original shipment, provided such products are used under normal conditions within the recognized pressure, flow and temperature limits and are given normal service and care. CMB INDUSTRIES MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In the event of a defect in material or workmanship of a product covered by this warranty, CMB Industries shall, at its sole option, repair or replace such defective product. This warranty is void with respect to any product which is altered or tampered with by anyone without prior consent of the Factory. CMB Industries shall not be liable under any circumstances for damages caused by accident, misuse or abuse of the product. IN NO EVENT SHALL CMB INDUSTRIES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. To make a claim under this warranty, the buyer must notify the Factory in writing within ten (10) days of discovery of any claimed defects or workmanship, and if authorized by the Factory, shall return the product in the same condition as when received by the buyer, transportation pre-paid, to the Factory or to such other location as directed by the Factory. If said returned product is found by the Factory to be defective in workmanship or materials, it shall be repaired or replaced without charge, pursuant to the terms of this warranty. This warranty excludes component parts or appurtenances not manufactured by CMB Industries. Any claims with respect to such equipment must be made to the manufacturer thereof in accordance with the terms of the warranty, if any, given by such manufacturer, or pursuant to such warranties as may exist by law. The physical or chemical properties of CMB Industries' products represent typical, average values obtained in accordance with test methods and are subject to normal manufacturing variations. The indicated minimum values are as shown. This information is supplied as a technical service and is subject to change without notice.

## **HOW TO ORDER PARTS**

- 1) Locate item number and part number in the Febco Maintenance Manual.
- 2) Verify the size of the valve the parts are to be used on.
- 3) Provide full model number. On large assemblies ( 2 1/2" - 10"), the model number is located on the name plate. On small assemblies (3/4" - 2"), the model number is cast on the body.
- 4) Identify the "type" code on 2 1/2" - 10" size valves (Ductile Iron bodies use Type D or YD code on name plate).
- 5) Give part number. Provide new part number if appropriate.
- 6) A serial number (located on the name plate) will assist in ordering the proper parts.
- 7) Some parts are sold only in kit form.



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Division of CMB Industries

# FEATURES & OPERATING PROCEDURES

## Reduced Pressure Backflow Preventer

Febco manufactures several models of Reduced Pressure Backflow preventers. The Model 825Y and 825YA are available in sizes 3/4" - 2" with bronze body and cover as standard. Other materials are available. The Febco Model 825 sizes 2 1/2" - 10" were manufactured with cast iron. The Febco Model 825 Type D and 825 Type YD sizes 2 1/2" - 10" are manufactured with standard body material of ductile iron.

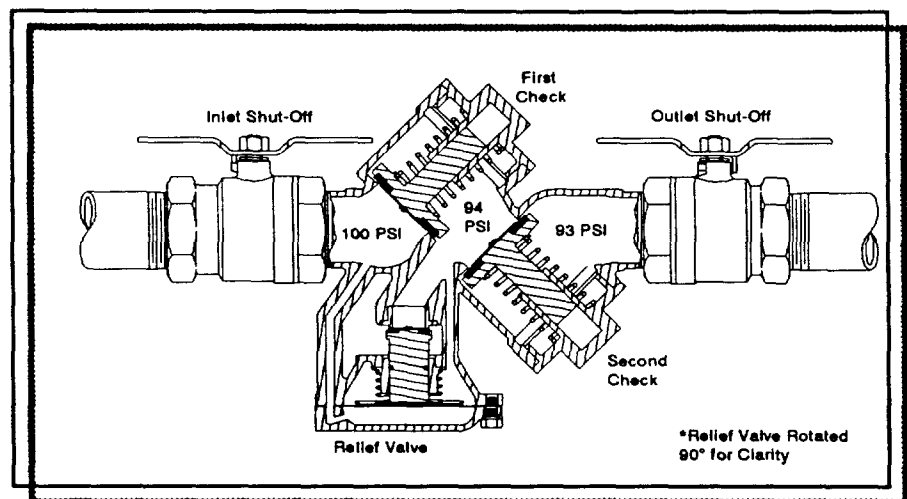
The Febco Reduced Pressure Backflow preventer assembly consists of two independently operating, spring loaded check valves with a pressure differential relief valve located between the two checks. The pressure drop across the first check valve is approximately 6.0 PSID with no flow. The relief valve

consists of a hydraulically balanced diaphragm with the high pressure side hydraulically connected to the upstream side of the first check. The low pressure side is hydraulically connected to the reduced pressure zone, thus the relief valve remains closed during normal operation. The low pressure side of the diaphragm is spring loaded to force the relief valve open when the pressure drop across the first check (and across the diaphragm) reduces to approximately 2.5 PSID. A complete assembly includes two shut-off valves and four testcocks.

Example sectional views below show typical components and flow passages with corresponding pressure readings (no flow conditions) at the various locations within the assembly.

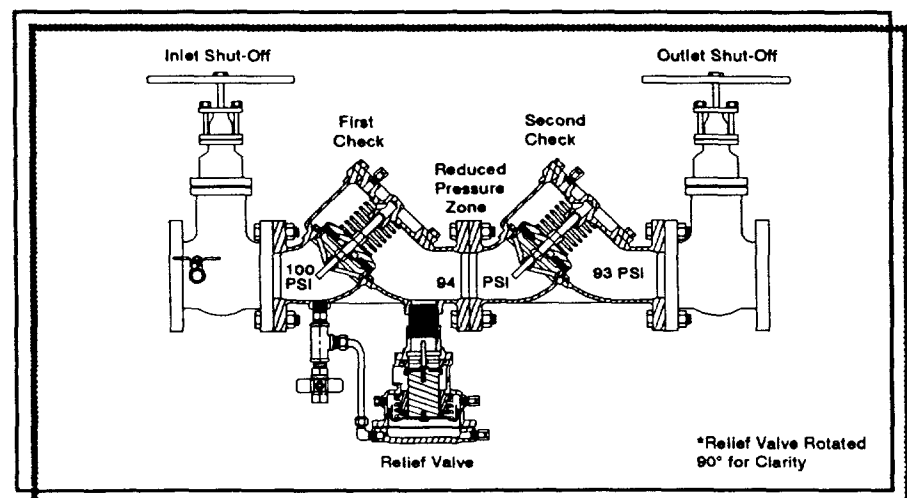
**MODEL 825Y**  
(3/4" - 2")

*Figure No. 1*



**MODEL 825YD**  
(2 1/2" - 10")

*Figure No. 2*



# INSTALLATION GUIDELINES

*Proper installation of the assembly is essential to the protection of the water supply. The following are important characteristics of a proper installation.*

1. The assembly should be installed in a horizontal position with a minimum clearance of 12" between the relief valve discharge port and floor or grade, and a minimum of 18" horizontal clearance around the unit for access and ease of testing and maintenance of the relief valve.

2. Approval agencies do not recommend installation of a Reduced Pressure Assembly in a pit. Flooding of the pit can result in cross connection contamination. If local codes permit installation of a Reduced Pressure Assembly in a pit, adequate drainage must be provided to prevent the pit from flooding under maximum discharge conditions.

3. Placement of the assembly should be planned where water discharged from the relief port will not be objectionable or cause damage to property and / or equipment.

4. To be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCC), the assembly must be purchased and installed with resilient seated shut-offs to insure bubble tight closure for more consistent results during testing. CAUTION: Open and close resilient seated shut-offs slowly to prevent water hammer damage to the system and assembly.

5. Since the Febco reduced pressure assembly is designed to be serviced while in line, the unit need not be removed from the line during servicing.

6. Insure the supply water pressure does not exceed the manufacturer's maximum water pressure rating of the assembly to avoid damage to the system or the assembly caused by system pressure. In addition, protection must be provided against thermal water expansion, extreme backpressure and/or water hammer.

7. Most field problems occur because dirt or debris present in the system at the time of installation becomes trapped in the first check seating area resulting in continuous discharge from the relief valve in a static or backflow condition. **THE SYSTEM SHOULD BE FLUSHED BEFORE THE ASSEMBLY IS INSTALLED.** However, to effectively flush the system after the

## TYPICAL INSTALLATIONS

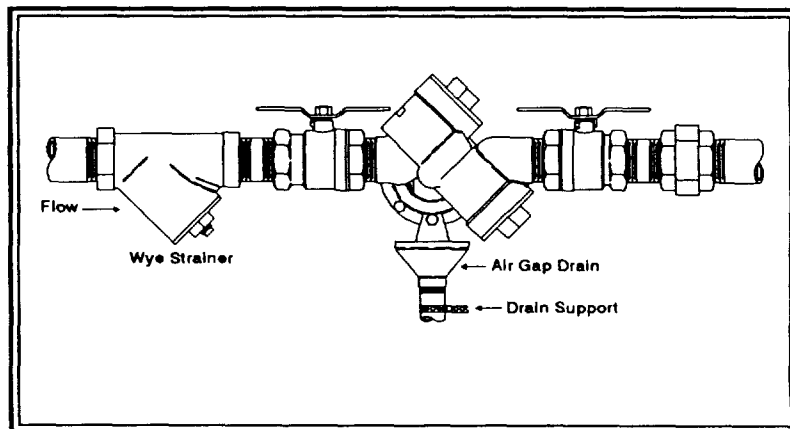


Figure No. 3

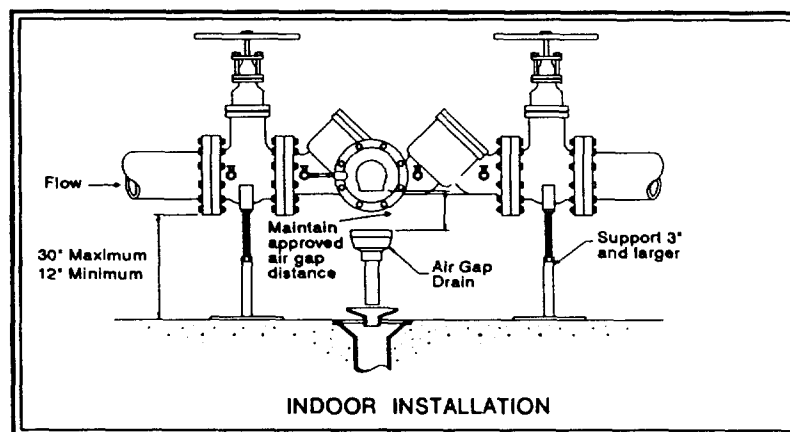


Figure No. 4

assembly has been installed, remove the internal components of both checks and open the inlet shut-off to allow water to flow for a sufficient time to flush debris from the line and assembly. If debris in the water system continues to cause fouling, a strainer can be installed upstream of the assembly.

# FREEZE PROTECTION PROCEDURE

The reduced pressure backflow prevention assembly is subject to damage if the internal water is allowed to freeze. It is suggested that all assemblies be installed with resilient seated shut-offs so that a drip tight closure can be achieved to prevent refilling of the assembly after the freeze protection procedure is performed. The unit must be protected from freezing by a heated enclosure, draining, insulation using heat tape, or other suitable means. However, the unit must always be accessible for testing and maintenance. If the system will be shut down during freezing weather, use the following procedure to drain internal passages.

The Model 825YA can be removed from line as a winterizing procedure. See figure 5 for proper ball valve procedure.

## **FREEZE PROTECTION MODEL 825Y (3/4" - 2") Reduced Pressure Zone And Relief Valve**

1. Slowly close the main shut-off valve upstream of the assembly, which provides water to the system.
2. Drain system water upstream of the first check by means other than through the assembly.

### **CHECK VALVE DRAINING PROCEDURE**

**3a.** First check (zone) Open #2 and #3 testcocks. All water between the first and second check valves will drain through the relief valve port.

**3b.** Second check (downstream)--Remove the second check cap, spring and disc holder. All water downstream of the second check (that is higher than the outlet shut-off valve) will drain through the body.

### **RELIEF VALVE DRAINING PROCEDURE**

**4a.** If device is equipped with optional drain plugs, remove plugs in the relief valve cover and body. Open #2 and #3 testcocks. All water will drain through plug holes.

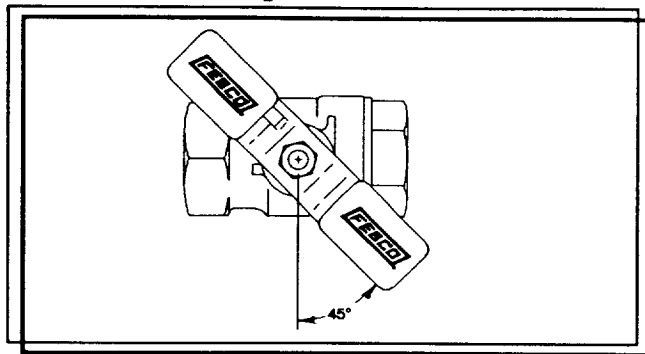
**4b.** For standard models (not equipped with optional drain plugs) loosen the relief valve cover and allow water to drain from both sides of the diaphragm.

### **BALL VALVE SHUT-OFF DRAINING PROCEDURE**

**5a.** If the assembly has been installed with ball valve shut-off valves, they must also be properly drained to prevent freeze damage. After draining procedure has been completed on the backflow prevention assembly, position all ball valve shut-offs and testcocks in a half open/half closed (45 degree) position. (see Figure 5)

**5b.** Open the ball valve approximately 45 degrees while draining the pipeline and assembly to allow water between the ball and valve body to drain. Leave the ball valve in this position for the winter to prevent freeze damage.

Figure No. 5



**5c.** The ball valves must be fully closed before the system is repressurized. **OPEN AND CLOSE BALL VALVES SLOWLY TO PREVENT DAMAGE TO THE SYSTEM CAUSED BY WATERHAMMER.**

## **FREEZE PROTECTION MODEL 825, 825D and 825YD (2 1/2"-10") Reduced Pressure Zone and Relief Valve**

1. Slowly close supply valve within freeze protected area, open air bleed valves on #1 check valve and relief valve (3 places), and open No. #2 and #3 testcocks. Water within the zone will be drained to the lowest point of the relief valve discharge port (relief valve seat). A minor amount of water will remain in the bottom of the valve body, but this is not sufficient to cause freezing damage.

2. With this procedure, about one-half of the relief valve will be drained. To drain the relief valve on Models 825 and 825D, loosen the relief valve cover bolts and allow the relief valve to drain. Re-tighten bolts before repressurizing system. To drain relief valve on Models 825YD, open the two air bleeds (one on the body, the other on the cover), then remove drain plugs. Replace drain plugs before repressurizing system.

3. The system design must provide a means for draining upstream of the #1 check valve and downstream of the #2 check valve. Testcocks #1, #2, and #4 and the air bleed valve on #2 check valve may be opened to allow air to enter to assist in draining. Depending on system design, these sections should be able to be drained to the pipe centerline.

4. Position the assembly shut-off valves and testcocks in the half open/half closed position to allow complete draining of the assembly shut-off valve bodies and testcocks.

5. Some units contain a drain plug in the bottom of the second check body. Open testcocks and remove plug to drain

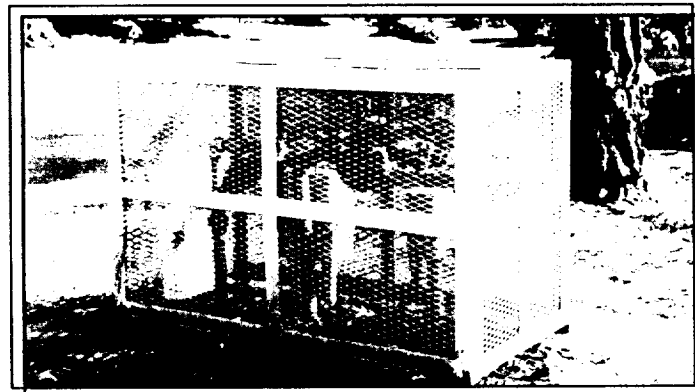
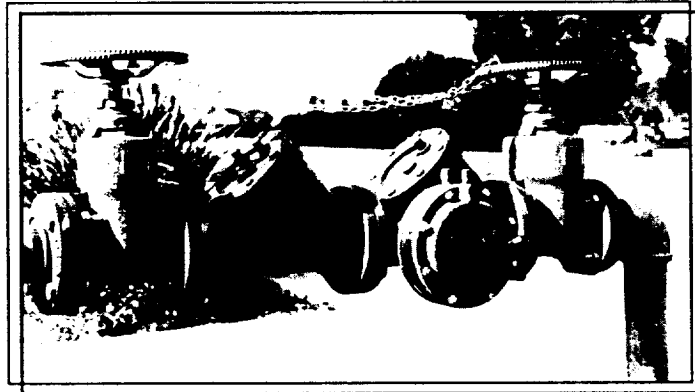
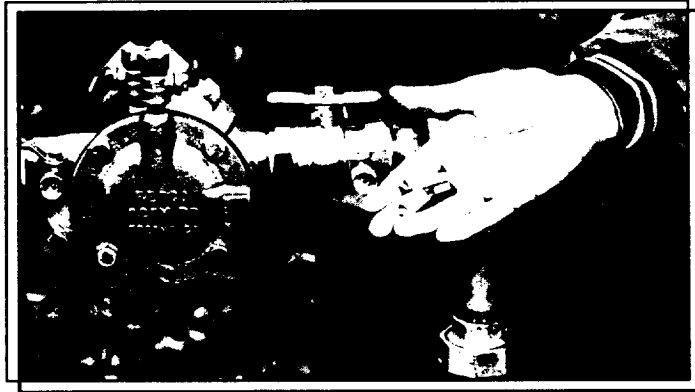
# VANDALISM PROTECTION PROCEDURE

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1. If the unit is installed where vandalism may be a problem, the assembly should be protected and secured. On 3/4"-2" units the handles of shut-off valves and testcocks can be removed to discourage tampering. On 2 1/2"- 10" units a chain can be looped between shut-offs and locked in position to prevent tampering with shut-off valves. Testcock handles can also be removed. On backflow prevention assemblies installed in conjunction with fire sprinkler systems, an alarm can be placed on the OS&Y shut-off valves that will sound if unauthorized closure should occur.

2. A protective cage can be installed over the unit to discourage vandals. If a cage is used, it should be installed so that adequate clearance is available for maintenance and testing or it should be completely removable. Also allow for any discharge from the relief valve to fully drain from the protective cage.

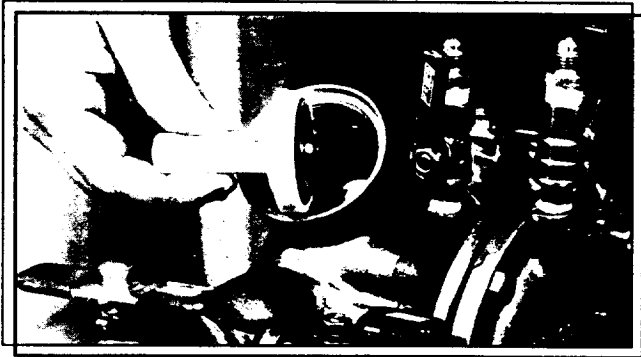
3. Some units include screw driver adjusted testcocks for vandal resistance.



# GENERAL SERVICE PROCEDURES

*General Service Instructions applicable to all models and sizes.*

1. Febco backflow prevention assemblies can be serviced with commonly available tools and are designed for ease of maintenance. The assemblies are designed to be serviced in line, so the unit should not need to be removed from the line during servicing.



2. The most common cause of check fouling and relief valve discharge is dirt and debris in the seating areas. The line should be flushed clean of debris before installation of the assembly. To flush the line after installation of the assembly, slowly close the inlet shut-off valve, remove the covers and internal assemblies of both check valves and open the inlet shut-off valve to allow sufficient flow of water through the assembly to clear all sand, debris, etc. from the line. If debris in the water continues to cause fouling, a strainer may be installed upstream of the assembly.

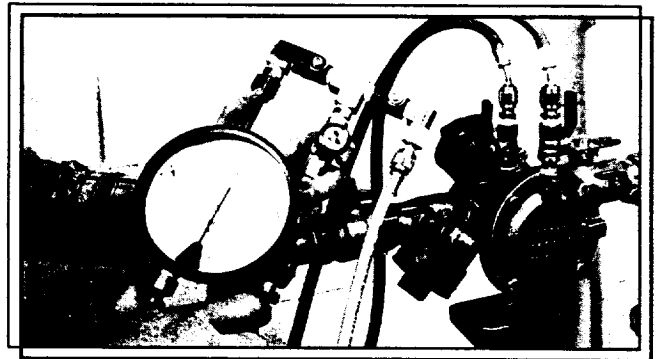
3. Rinse all parts with clean water before reassembly.

4. Do not use any petroleum based oil, grease, solvent or pipe dope on any parts unless instructed to do so. Use only water resistant lubricants that comply with FDA requirements for use in potable water systems.

5. Carefully inspect diaphragms, seals and seating surfaces for damage or debris. If the check valve seat disc has been severely cut at the seat ring diameter, the assembly has been subjected to extremely high and repeated back pressure. Either thermal water expansion or water hammer are the most likely causes. If back pressure persists, consider installation of a pressure relief valve downstream of the assembly.

6. Use caution to avoid damaging any guiding surfaces while handling parts. Do not force parts together. The o-ring seals used in Febco assemblies require only a small tightening force to insure a positive seal.

7. Test unit after servicing to insure proper operation.



8. Refer to applicable parts list and figures for visual aid information

*Figure No. 6*

## Suggested Tool Kits

### MODEL 825Y (3/4"-2")

- 1 Crescent wrench (10")
- 1 Medium Phillips screw driver
- 1 Medium straight blade screw driver
- Allen Head wrench (3/16" & 1/4" size)
- 1 Thin blade knife or reamer
- 1 Socket (1/2" and 9/16" size)
- Differential pressure test kit
- FDA Approved lubricant
- Needle nose pliers

### MODEL 825, 825D AND 825YD (2 1/2"-10")

- 1 Crescent wrench (12")
- 1 Medium Phillips screw driver
- 1 Medium straight blade screw driver
- 1 Set of drive sockets (3/8" or 1/2")
- 1 Spring removal tool (see page 32)
- 1 Torque wrench
- Differential pressure test kit
- FDA approved lubricant

# Trouble Shooting Procedure

## WITH DIFFERENTIAL PRESSURE GAUGE

**SYMPTOM NO. 1: Check Differential Across No. 1 Check Valve**

READING	PROBLEM
2 to 3 PSID	Leak in No. 1 or No. 2 check valve
6 to 8 PSID and steady	Malfunctioning pressure relief valve
2 to 7 PSID fluctuating	Inlet pressure fluctuating

## WITH DIFFERENTIAL PRESSURE GAUGE

**SYMPTOM NO. 2:  
Check Differential Across No. 1 Check Valve**

READING	PROBLEM
2 to 3 PSID	No. 1 check valve held open
6 to 8 PSID and steady	Malfunctioning pressure relief valve

## WITHOUT DIFFERENTIAL PRESSURE GAUGE

**SYMPTOM NO. 1 and NO. 2:  
A). Close Gate Valve No. 2**

RESULT	PROBLEM
If discharge stops	Leak in No. 2 check valve
If discharge does not stop	Go to "B"

**B). Open No. 4 Testcock To Produce A Flow Greater Than Differential Relief Valve Discharge**

RESULT	PROBLEM
If discharge stops	Leak in No. 1 check valve
If discharge does not stop	Malfunctioning pressure relief valve

# Trouble Shooting Guide

SYMPTOM	CAUSE	SOLUTION
<b>1. Continuous discharge from relief valve during NO-FLOW condition (Discharge stops with water flow).</b>  With this symptom, the pressure drop across the No. 1 check valve would be 2 to 3 PSID.  If a flow of water (more than the discharge) is created through the valve, the pressure drop should increase to approximately 7 PSID.	a. Debris fouling No. 1 check valve.	a. Inspect and clean.
	b. Outlet pressure higher than inlet pressure and debris fouling No. 2 check valve.	b. Inspect and clean.
	c. Disc holder/stem not moving freely in guide(s).	c. Inspect for dirt or other foreign material.
	d. Damaged seat or seat disc.	d. Inspect and replace. Seat disc can be reversed.
	e. Leakage at o-ring on the seat ring or disc holder/stem (825, 825D, 825YD).	e. Inspect and replace o-ring.
	f. Leakage under seat disc due to dirt or damaged disc holder or disc.	f. Inspect and replace or repair.
	g. Leakage through diaphragm due to stretched holes or cut (825Y & 825YD)	g. Inspect and replace diaphragm.
<b>2. Intermittent discharge from relief valve during NO-FLOW condition.</b>  With this symptom, the pressure drop across the No. 1 check valve would be varying from about 2 to 7 PSID.	a. Inlet line pressure variations causing relief valve to discharge.	a. Eliminate or reduce pressure variations.
	b. Pressure surges (water hammer) causing relief valve to discharge as pressure wave passes through "ZONE".	b. Eliminate or reduce pressure surges.
<b>3. Continuous discharge from relief valve during FLOW and NO-FLOW conditions.</b>  With this symptom, the pressure drop across the No. 1 check valve would be 7 PSID or more at all times.	a. Seat disc dislodged from cavity in the mainstem (this can be caused by pressure surges during initial filling of of system lines).	a. Reposition disc in mainstem cavity. Re-pressurize system slowly.
	b. Debris fouling the relief valve seat.	b. Inspect and clean.
	c. Debris fouling the relief valve seat passage	c. Inspect and clean.
	d. Dirt or scaling jamming mainstem or or spring button.	d. Inspect and clean or replace.
	e. Leakage at mainstem o-ring/diaphragm.	e. Inspect and clean or replace o-ring and/or mainstem.
	f. Jammed mainstem due to excessive torque on center bolt (825 and 825D).	f. Do not exceed 15 inch-pound torque on mainstem center bolt.

# Trouble Shooting Guide (Continued)

SYMPTOM	CAUSE	SOLUTION
4. Relief valve does not open above 2.0 PSID during field testing.	a. Outlet gate valve not closed completely.	a. Check for debris blocking gate
	b. Plugged low pressure hydraulic passage (from "ZONE" to inner diaphragm).	b. Inspect and clean.
	c. Improper alignment of internal parts during re-assembly (causing high resistance to movement).	c. Disassemble and center the button, spring and mainstem.
	d. Jammed mainstem due to excessive torque on center bolt (825 and 825D only).	d. Do not exceed 15 inch-pound torque on mainstem center bolt.
5. First check pressure drop is low (less than 5 PSID) during field testing.	a. Debris fouling first check seat.	a. Inspect and clean.
	b. Debris fouling second check seat with backpressure.	b. Inspect and clean.
	c. Inlet pressure variations causing inaccurate gauge reading.	c. Eliminate pressure variations.
	d. Disc holder not perpendicular to stem (therefore, disc not parallel to seat ring) (825, 825D, 825YD).	d. Inspect and re-assemble if required. NOTE: SPRING MUST BE REMOVED WHEN TIGHTENING DISC HOLDER TO STEM.
	e. Damaged seat or seat disc.	e. Inspect and replace as required.
	f. Worn guide, bushings or stem.	f. Inspect and replace as required.
	g. Guide not properly seated in cover (825, 825D and 825YD only).	g. Inspect and re-assemble.
6. Discharge from drain hole in relief valve spacer (825 and 825D only).	a. Leakage under diaphragm retaining screw (8 places).	a. Apply thin layer of sealant around each thread, insert on bottom and re-assemble.
	b. Leakage under diaphragm at mainstem diameter.	b. Apply thin layer of sealant on button at the mainstem diameter. DO NOT EXCEED 15 INCH POUNDS when tightening center bolt.
	c. Hole in diaphragm.	c. Replace diaphragm with fabric side towards the button.
7. Second check fails to hold back pressure during field testing.	a. Outlet gate valve not closed completely.	a. Check for debris blocking gate.
	b. Debris fouling second check seat.	b. Inspect and clean.
	c. Disc holder/stem not moving freely in guide(s).	c. Inspect for dirt or other foreign material.
	d. Disc holder not perpendicular to stem (therefore, disc not parallel to seat ring) (825, 825D & 825YD).	d. Inspect and re-assemble if required. NOTE: SPRING MUST BE REMOVED WHEN TIGHTENING DISC HOLDER TO STEM.
	e. Damaged seat or seat disc.	e. Inspect and replace as required.
	f. Worn guide, bushings or stem.	f. Inspect and replace as required.
	g. Guide not properly seated in cover (825, 825D and 825YD only).	g. Inspect and re-assemble.

**NOTE:** If check valve seat disc has been severely cut at the seat ring diameter, the assembly is being subjected to extremely high and repeated back pressure. Either thermal water expansion or water hammer are the most likely causes.



# Field Testing Procedures

## PURPOSE OF TEST

To test the operation of the DIFFERENTIAL PRESSURE RELIEF VALVE and CHECK VALVE.

## EQUIPMENT REQUIRED FOR TEST

Differential Pressure Gauge test kit. Equal to the RPTK1 (shown on page 12).

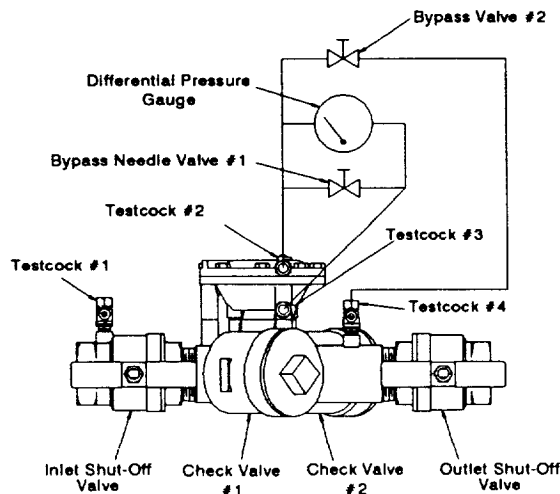
## TEST DIFFERENTIAL RELIEF VALVE

The Differential relief valve must operate to keep the zone between the two check valves at least 2 PSI less than the supply pressure.

1. Slowly close the outlet shut-off on the discharge side of the backflow preventer.
2. Open air bleeds and testcocks until all air from the check valves is released.
3. Connect the "high" side of the differential pressure gauge to testcock #2 and the "low" side to testcock #3.
4. Open testcock #2 and testcock #3 and bleed all air from the hose and gauge.
5. Slowly open the bypass valve needle #1 until the differential gauge needle starts to drop. Hold the bypass in this position and observe the reading on the gauge at the moment the first discharge is noted from the relief valve. The differential pressure at the time the relief valve opens must be no lower than 2 PSI.
6. Close the bypass needle valve.

### FEBCO MODEL 825Y (3/4" - 2") Reduced Pressure Backflow Preventer

Figure No. 7



## TEST CHECK VALVE 1

The check valve must be at least 3 PSI more than the relief valve opening pressure.

1. Open testcock #4 to flow a small amount of water through the unit to restore normal pressures.
2. Observe the differential gauge with bypass valve #1 closed and testcock #2 and #3 open. The gauge should remain at a reading of at least 3 PSI above the relief valve. If it drops below this, the check valve is leaking and must be serviced.

## TEST CHECK VALVE 2

The check valve must be tight against reverse flow under all pressure differentials.

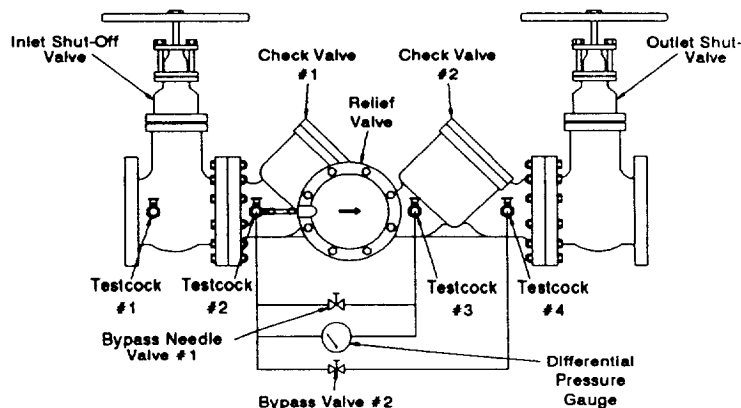
1. Connect the "high" side of the differential pressure gauge to testcock #4 (3rd hose).
2. Open testcock #4. With bypass needle valve #1 closed and bypass valve #2 open, observe gauge reading. The differential pressure should not drop to the relief valve opening point.

## RESTORE OPERATION

1. Restore all valves and testcocks to their original positions. Open and close resilient seated shut-offs slowly to prevent damage to the system and assembly.

### FEBCO MODEL 825YD (2 1/2" - 10") Reduced Pressure Backflow Preventer

Figure No. 8



# Field Testing Procedures

## TEST FOR THE 826YD

This device is tested with the same procedure as the Model 825YD. However, the bypass 825Y 3/4" valve must be isolated from the mainline valve using the 3/4" ball valves during the test and tested separately.

### PROPER BYPASS OPERATION

Flow 3 GPM through the bypass by opening the mainline test cock #4. Use the flow meter for this measurement (1 gallon flow in a 20 second time period). After the flow rate has been set, collect the discharge flow in a container for 20 seconds. The volume of water collected should be one gallon.

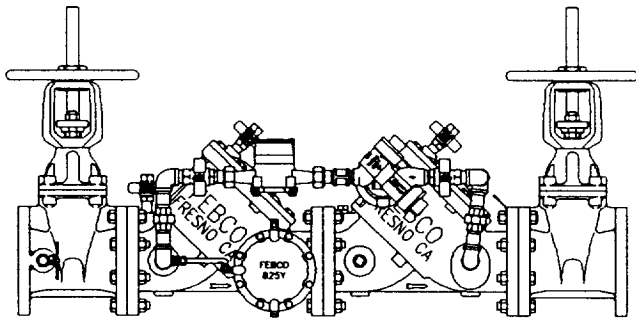
### RESTORE OPERATION

After testing restore all valves to their original positions.

Note: This is a suggested typical test method. Check with your local code for approved test procedures in your area.

## FEBCO MODEL 826YD (2 1/2" - 10") Reduced Pressure Backflow Preventer

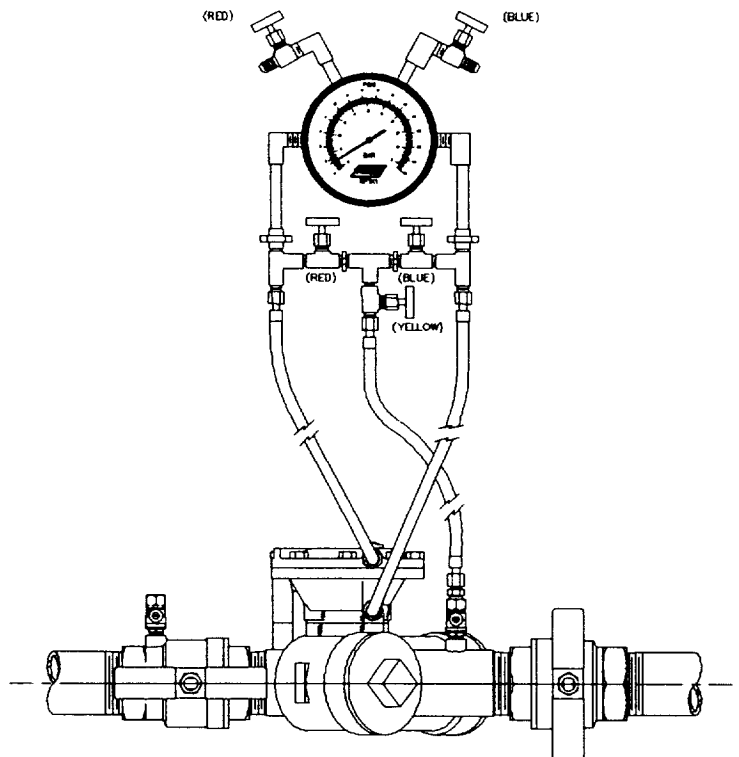
Figure No. 9



## TESTING WITH THE FEBCO TEST KIT

The FEBCO Test Kit includes gauge, complete with hoses, fittings, adapters and laminated instructions in a compact plastic case. The FEBCO Test Kit includes a differential pressure gauge used to test all approved Reduced Pressure Assemblies including the Febco Models 825Y, 825YA, 825YD Reduced Pressure Assemblies and the 826YD Reduced Pressure Detector Check.

Figure No. 10



# Service Procedure 825Y and YA (3/4" - 2")

## 1. Check Valve Inspection/Repair Model 825Y (3/4"-2") (See Figure No. 11)

a. Close inlet and outlet shut-off valves. Bleed residual pressure by opening first the #4 testcock, then the #3 and #2 testcocks. See Figure No. 7 for testcock locations.

b. Unscrew Cap using appropriate size wrench.

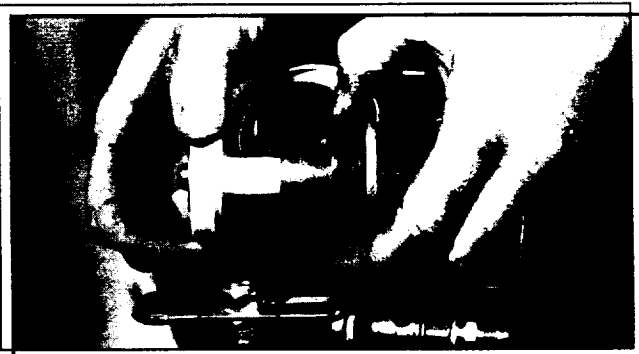
**CAUTION:** Cap is spring loaded. First check spring force on 3/4" to 1 1/2" is 10 lb. First check spring force on 1 1/2" to 2" is 28 lb. Retain cap with appropriate amount of hand force to avoid injury. Second check spring force is approximately 1/4 of the first check spring.



c. Remove the spring and disc holder assembly.

d. Inspect guiding bore of the cap and poppet stem for any build-up of calcium or other mineral deposits. If this condition exists, it may be removed with the careful use of an appropriate size reamer or a thin blade knife. 3/4"-1 1/4" cap --5/8" (.6250) reamer 1 1/2"- 2" cap--7/8" (.8750) reamer.

e. Check disc holder and stem movement in the guide to insure they move freely. Debris can inhibit proper movement.



## 2. Check Valve Seat Replacement Model 825Y (3/4"-2") (See Figure No. 11)

a. Hold disc holder assembly in one hand and remove screw and disc washer.

**CAUTION:** The use of pliers or other tools may damage the guiding surfaces and require unnecessary replacement. Do not scratch or mark sealing or guiding surfaces.

b. Inspect seat disc for wear or cuts. Remove old seat disc and install new, or turn used disc over if new seat disc is not available.



**NOTE:** The seat discs are symmetrical. It is usually possible to turn the disc over and obtain an effective seal.

c. If the seat disc has been severely cut along the seat ring diameter, the assembly is being subjected to extremely high back pressure from thermal water expansion, water hammer or other causes of excessive water pressure. Seat discs damaged in such a manner should be replaced and not turned over to be re-used.

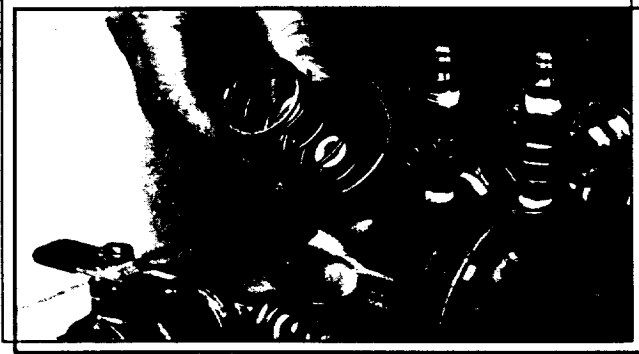
## 3. Check Valve Reassembly Model 825Y (3/4"-2") (See Figure No. 11)

a. Position the disc in the cleaned holder and retain with disc washer and screw. **CAUTION: DO NOT OVERTIGHTEN SCREW, SECURE WITH APPROXIMATELY 12 INCH-LBS.**

b. Position the spring around the centering ring of the disc holder and reinsert the disc holder assembly into the check body.

**NOTE:** Insure the heavy check spring is installed in the No. 1 check valve or the valve will not operate properly and a continuous discharge may occur.

# Service Procedure 825Y and YA (3/4" - 2")



c. Apply a thin coating of FDA approved lubricant on the o-ring in the cap and thread cap onto the check valve body using the appropriate sized wrench.

d. Close the #4, #3, and #2 testcocks and slowly open first the inlet and then outlet shut-off valves and return the assembly to service. See Figure No. 7 for testcock locations.

e. Test the assembly to insure it is operating properly.

## **4. Relief Valve Inspection/Repair Model 825Y (3/4"-2") (See Figure No. 11)**

a. Slowly close the inlet and outlet shut-off valves and bleed off the residual pressure by opening first test cocks #4, then #3 and #2. See Figure No. 7 for testcock locations.

b. Remove capscrews, diaphragm cover, diaphragm and port bushing of relief valve.

c. Remove the integral relief valve assembly by pulling straight out of the body to remove the internal assembly.

d. Remove the disc washer and seat disc by unthreading the screw.



e. To remove spring and/or mainstem from the guide, keep unit compressed and remove the screw (item 18) located in the center of the button. Push the mainstem through the guide and remove the o-ring from the mainstem. Inspect and clean or replace o-ring and seat disc as required. Clean all parts thoroughly with clean water before re-assembly.

## **5. Relief Valve Seat Removal Model 825Y (3/4"-2")**

*Standard only on units manufactured after October of 1988 with serial numbers higher than listed below. See Figure No. 11 for exploded view of this relief valve.*

### **Serial Numbers of New Model 825Y with Replaceable Relief Valve Seat Ring**

#### **Size Serial Number**

3/4" Serial No. 86528 and above

1" Serial No. 86163 and above

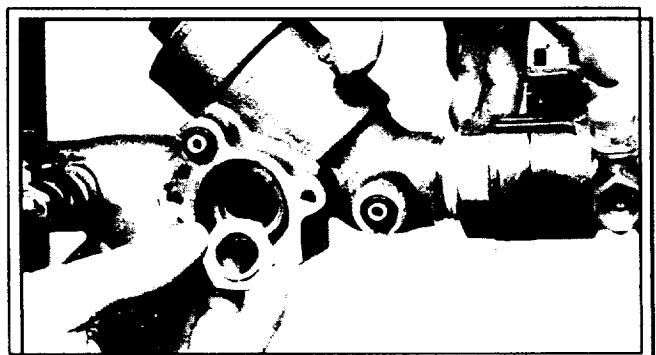
1 1/2" Serial No. 85710 and above

2" Serial No. 85089 and above

a. While relief valve is disassembled, remove the two allen head socket capscrews using the appropriate sized allen head wrench. ( 3/16" allen head wrench for 3/4" and 1" assemblies, and 1/4" allen head wrench for 1 1/2" and 2" assemblies.)

b. Pull the relief valve body from the main valve body. Pull the discharge shield from the seat ring.

c. Remove seat ring with the appropriate sized socket or needle nose pliers. Use care to avoid damage to the seat edge. Replaceable relief valve seat is standard only on units manufactured after October of 1988.



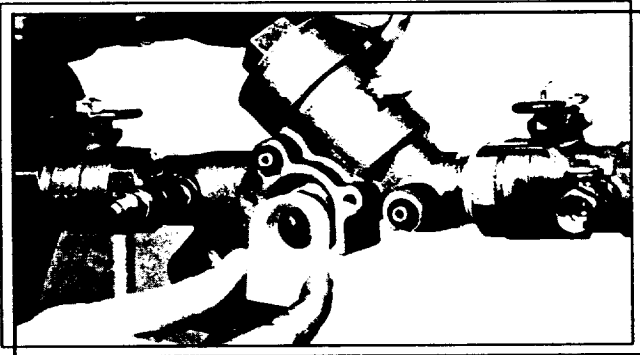
# Service Procedure 825Y and YA (3/4" - 2")

d. Inspect seat ring, o-rings, bushings, and gasket seals for damage. Rinse all parts with clean water before reassembly.

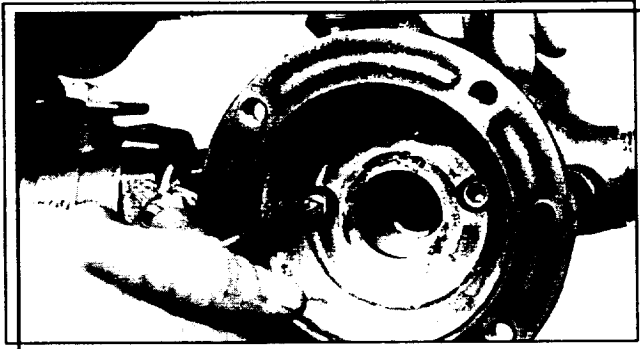
## 6. Relief Valve Re-assembly Model 825Y (3/4"-2") (See Figure No. 11)

a. Lubricate the seat ring o-ring with FDA approved lubricant and thread seat ring into the valve body until seated. Do not over tighten. (Replaceable relief valve seat ring standard on units manufactured after October of 1988.)

b. Position the discharge shield over the seat ring diameter and, taking care not to damage the two flow passages, reinstall o-rings and guide bushings.

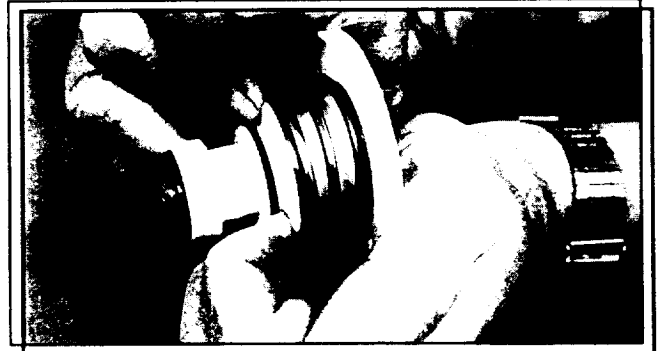


c. Carefully place the relief valve body over the bushing and tighten the two capscrews to retain the relief valve body to the main valve body. New capscrew sealing washers should be installed to avoid leakage.



d. Lubricate the o-rings and mainstem using FDA approved lubricant. Place the mainstem and spring into the guide and replace the flat-head screw located at the center button.

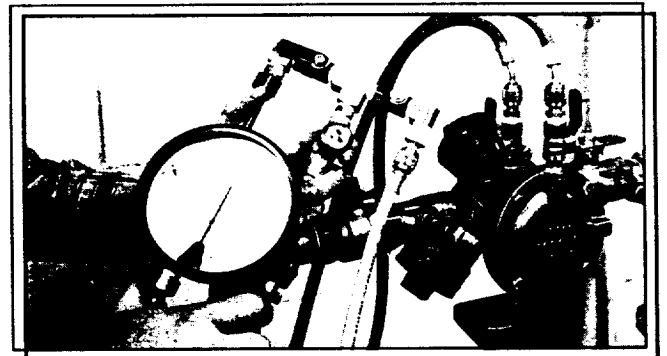
e. Place the disc washer and seat disc in position and retain with machine screw. Depress the diaphragm button to insure it is free moving.



f. Place the relief valve module into the relief valve body and mount the diaphragm. Be careful to position the diaphragm over the port bushing. Replace the relief valve cover and tighten the capscrews.

g. After completing reassembly, slowly open the inlet shut-off valve. Then bleed air from each chamber and from the relief valve cover by opening testcocks #4, #3, and #2. See Figure No. 7 for testcock locations. Slowly open outlet shut-off valve and return the valve to service.

h. Test the assembly to insure it is operating properly.



# Model 825Y and YA (3/4" - 2") Parts

## MODEL 825Y & YA PART NUMBERS (SIZES 3/4" - 2")

Fig. No.	DESCRIPTION	QTY. REQ.	SIZE 3/4"	SIZE 1"	SIZE 1 1/4"	SIZE 1 1/2"	SIZE 2"
3	Bushing	3	500-290	500-290	500-290	500-290	500-290
4	O-Ring	2	399-202-72	399-202-72	399-202-72	399-202-72	399-202-72
5	Gasket	2	340-078	340-078	340-078	340-079	340-079
6	Capscrew	2	515-513-05	515-513-05	515-513-05	515-514-06	515-514-06
7	Cap	2	101-028	101-028	101-043	101-034	101-034
8	O-Ring	2	398-226-72	398-226-72	398-226-72	398-235-72	398-235-72
9	Disc Holder	2	500-270	500-270	500-270	500-278	500-278
10	Seat Disc	2	400-099	400-099	400-099	400-103	400-103
11	Washer	2	300-084	300-084	300-084	300-108	300-108
12	Screw	2	516-543-03	516-543-03	516-543-03	516-543-03	516-543-03
13	Spring (Inlet)	1	630-125	630-125	630-125	630-137	630-137
14	Spring (Outlet)	1	630-115	630-115	630-115	630-118	630-118
15	Bolt	4	511-514-06	511-514-06	511-514-06	****	****
15	Bolt	8	****	****	****	511-515-07	511-515-07
16	Cover	1	101-029	101-029	101-046	101-035	101-035
17	Diaphragm	1	400-101	400-101	400-101	400-104	400-104
18	Screw	1	700-107	700-107	700-107	519-513-03	519-513-03
19	Button	1	500-284	500-284	500-284	300-107	300-107
20	Spring	1	630-126	630-126	630-126	630-138	630-138
21	Mainstem	1	500-273	500-273	500-273	500-280	500-280
22	O-Ring	1	398-113-72	398-113-72	398-113-72	398-120-72	398-120-72
23	Guide	1	500-277	500-277	500-277	500-281	500-281
24	O-Ring	1	398-022-72	398-022-72	398-022-72	398-127-72	398-127-72
25	Seat Disc	1	400-102	400-102	400-102	400-105	400-105
26	Washer	1	300-104	300-104	300-104	300-105	300-105
27	Screw	1	700-137	700-137	700-137	519-513-03	519-513-03
101	Seat Ring (Relief Valve)	1	200-779	200-779	****	200-780	200-780
102	O-Ring (Relief Valve)	1	399-019-72	399-019-72	****	399-026-72	399-026-72
103	Elbow (YA only)	2	101-194	101-195	****	101-189	101-190
104	O-Ring (YA only)	2	398-223-72	398-223-72	****	398-230-72	398-230-72

## SHUT-OFFS: MODEL 825Y & YA

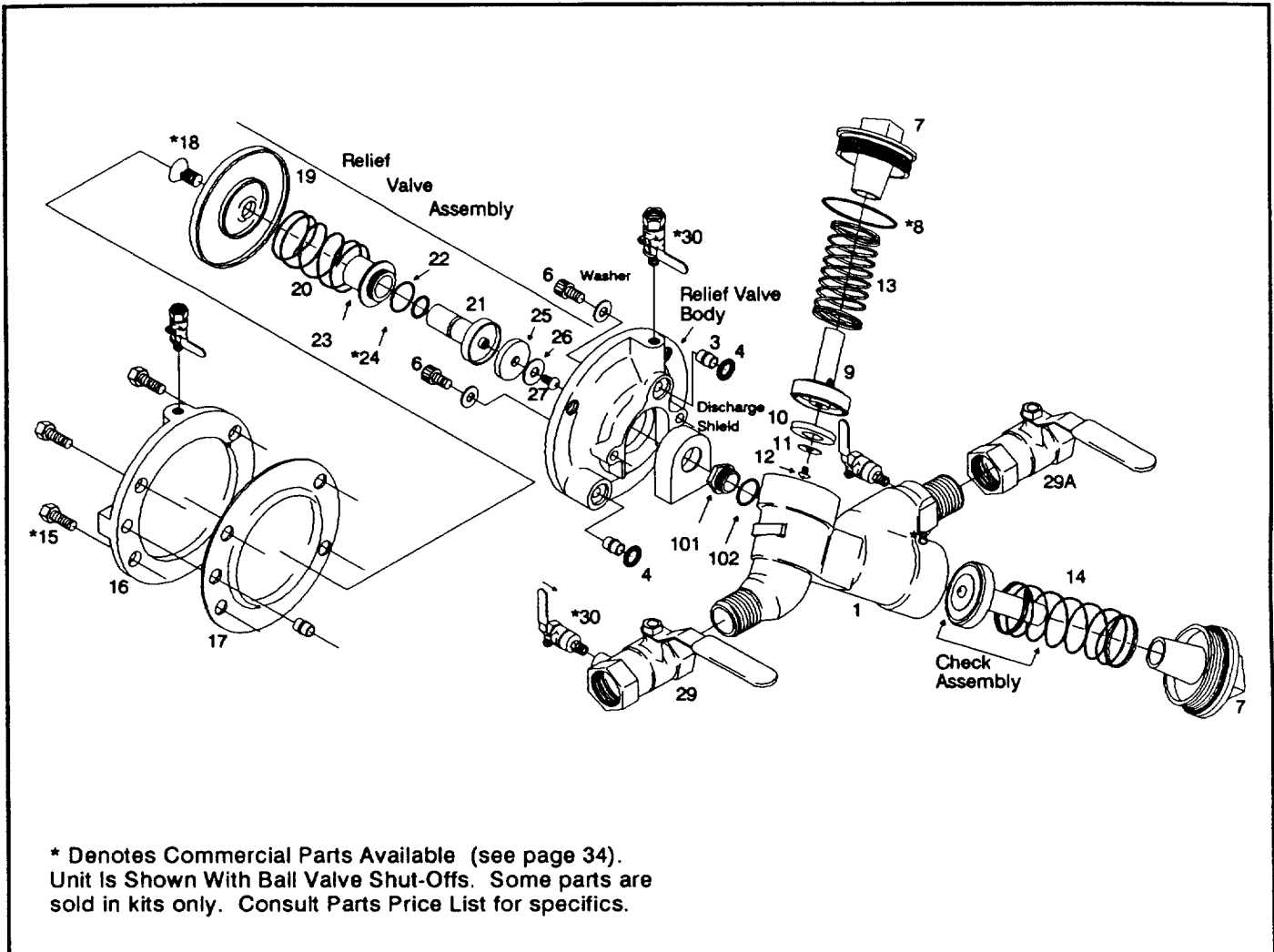
29	Ball Valve (Inlet)	1	781-053	781-054	781-055	781-056	781-057
29A	Ball Valve (Outlet)	1	781-048	781-049	781-050	781-051	781-052
30	Testcock	4	781-074	781-074	781-075	781-075	781-075

## ASSEMBLIES / KITS: MODEL 825Y & YA

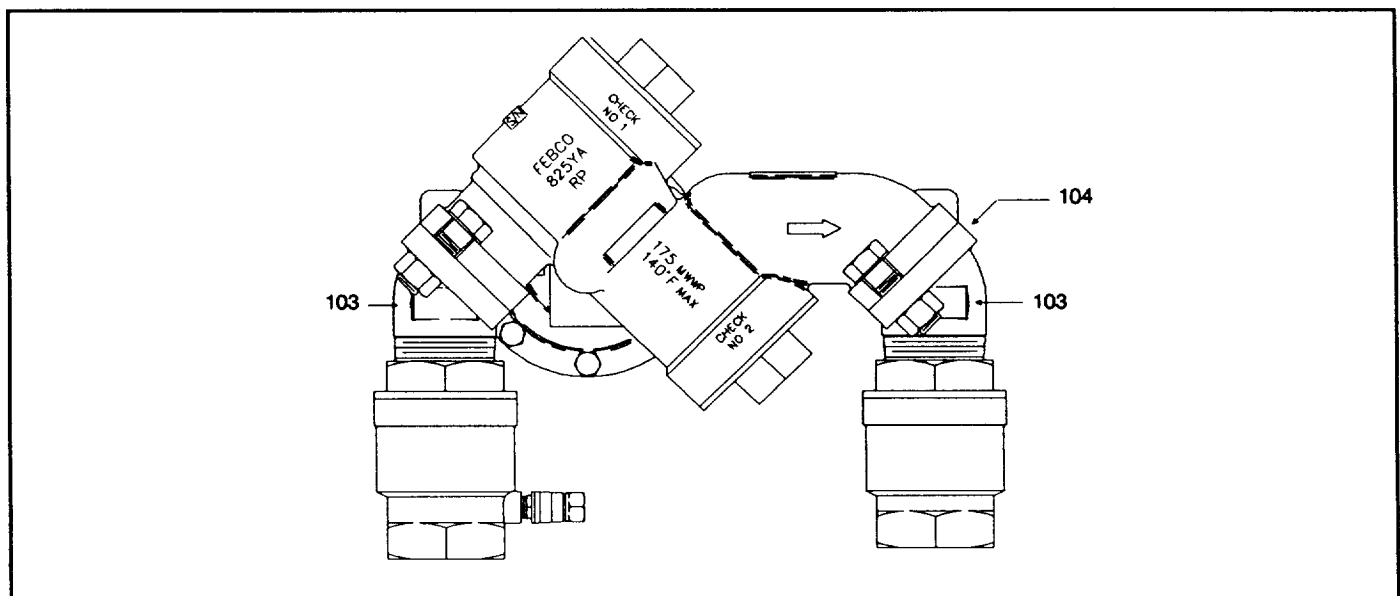
Check Valve Rubber (8 and 10)	2 ea.	905-042	905-042	905-042	905-053	905-053
Relief Valve Rubber (17, 22, 24 & 25)	1 ea.	905-043	905-043	905-043	905-054	905-054
Check Valve Assembly (8 to 12)	1 ea.	905-044	905-044	905-044	905-055	905-055
Relief Valve Assembly (17 TO 27)	1 ea.	905-045	905-045	905-045	905-056	905-056
Seat Ring Kit (101, 102)	1	905-113	905-113	****	905-114	905-114
Complete Rubber Parts Kit (3,4,5,8,10,17,22,24,25,102)	1	905-111	905-111	905-111	905-112	905-112

\*Quantity required per valve.

## Model 825Y (3/4" - 2") Figure No. 11



## Model 825YA (3/4" - 2") Figure No. 12



# Service Procedures for Models 825, 825D, 825YD and 826YD (2 1/2" - 3")

## **1. Check Valve Disassembly Models 825, 825D and 825YD (Sizes 2 1/2" - 3") (See Figure No.13)**

a. Slowly close outlet shut-off valve and inlet shut-off valve. Bleed residual pressure by opening #4, #3, and #2 testcocks. See Figure No. 8 for testcock location.

b. Remove cover bolts uniformly while holding cover in place. Remove cover.

**CAUTION: Spring is retained in body by cover.**



c. Lift check assembly from body being careful not to damage internal epoxy coating.

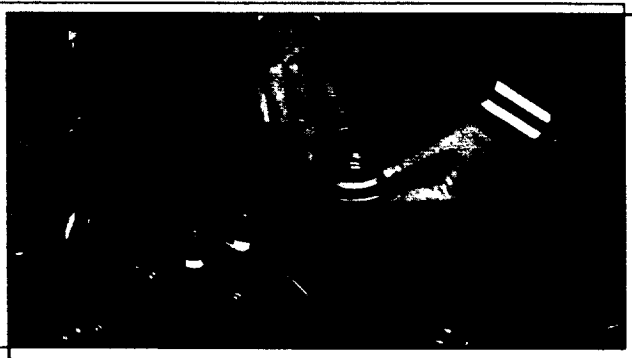
d. If necessary, unthread bushing (item 4A) from cover.

## **2. Check Assembly Repair Models 825, 825D and 825YD (Sizes 2 1/2"-3") (See Figures No. 13 & 14)**

a. Unthread nut on stem and remove disc washer and seat disc.

b. Inspect seat disc for wear or damage. Replace with new seat disc or turn used disc over if new disc is not available.

**NOTE: The discs are symmetrical. It is usually possible to turn the disc over and obtain an effective seal.**



c. If the seat disc has been severely cut along the seat disc ring diameter, the assembly is being subjected to extremely high back pressure from thermal

water expansion, water hammer, or other causes of excessive water pressure. A disc damaged in such a manner should be replaced and not turned over to be re-used.

## **3a. Valve Seat Removal (Sizes 2 1/2"-3") Threaded-in Seat Ring Type Models Model 825 (See Figure No. 13)**

1. Remove seat ring by unthreading in counter-clockwise direction being careful not to damage the internal epoxy coating in valve. A tool to aid in this process is described in Figure No. 21 on page 32.



2. Remove bushing and bushing nut (item 2A & 2B).

3. Remove o-ring.

## **3b. Valve Seat Removal (Sizes 2 1/2"-3") Bolted in Seat Ring Type Models Models 825D & 825YD (See Figure No. 16)**

1. Remove the three capscrews and washers retaining the seat ring.



2. Pull the seat ring from the valve body being careful not to damage the internal epoxy coating of valve.



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# Service Procedures for Models 825, 825D, 825YD and 826YD (2 1/2" - 3")

---

3. If necessary, unthread the bushing (Item 2A) from the seat ring.

4. Remove the o-ring.

---

## **4a. Valve Seat Reassembly (Sizes 2 1/2"-3") Threaded-in Seat Ring Type Models Model 825 (See Figure No. 13)**

---

1. Lubricate o-ring with FDA approved lubricant and replace on seat ring.

2. Reinsert bushing into seat ring center.

3. Thread seat ring into valve body in clockwise direction being careful not to damage the internal epoxy coating of valve.

---

## **4b. Valve Seat Reassembly (Sizes 2 1/2"-3") Bolted-in Seat Ring Type Models Model 825D & 825YD (See Figure No. 13)**

---

1. Lubricate o-ring with FDA approved lubricant and replace in seat ring.

2. Thread bushing into seat ring.

3. Place the seat ring carefully into body and retain with three capscrews and washers being careful not to damage the internal epoxy coating of valve.

---

## **5. Check Valve Reassembly (Sizes 2 1/2"-3") (See Figures No. 13 & 14)**

---

a. Position the disc in the cleaned holder and retain with disc washer. Insert stem into disc holder, replace the nut on stem and tighten.

NOTE: On older Model 825 valves, the disc holder is sealed to the stem with a sealant. If the seal is broken, the stem and holder must be cleaned and new sealant applied. Newer valves, Models 825D and 825YD, use an o-ring so a sealant is not required.

b. Thread bushing into cover.

c. Carefully place stem of check assembly into seat ring bushing. Replace spring centering diameter on the disc washer. NOTE: Be sure the heavier spring (6 PSI) is placed in first check and lighter spring (2 PSI) is placed in second check or the unit will not operate properly and discharge from the relief valve could occur. The wire diameter is visibly thicker on the heavier spring and thinner on the lighter spring. Care should be taken to avoid damaging internal epoxy coating of valve.

d. Place cover on check body securing spring and stem into cover.

e. Bolt cover onto check body while holding cover in place with appropriate hand force. Spring will be retained in body by cover.

f. Slowly open inlet shut-off valve. Bleed air from valve by opening first the #4 testcock, then the #3, #2 and #1 testcocks and air bleeds on all covers. See Figure No. 8 for testcock locations.

g. Slowly open outlet shut-off valve and return the valve to service.

h. Test the assembly to insure it is operating properly.



# Service Procedures

## Models 825, 825D, and 825YD (4" - 10")

### 1. Check Valve Disassembly (Sizes 4"-10") (See Figures No. 13 & 14)

a. Slowly close outlet gate valve then slowly close inlet gate valve. Bleed residual pressure by opening first the #4 testcock, then #3, and #2 testcocks. See Figure No. 8 for testcock locations.

b. Remove cover bolts and cover. Unscrew bolts uniformly to avoid binding of the cover. The spring will push the cover approximately 1/2 inch off the top of the valve body.

### 2. Seat Disc Removal (Sizes 4"-10")

**CAUTION:** The newer model 825 cast iron units have threaded disc holders with four (4) cast lugs, (6 lugs on 10" assemblies), 1/2" high located on back side, outside the spring diameter. If the Model 825 you are servicing does not have these lugs, **SPRING TENSION MUST BE RELEASED BY USING THE SPRING REMOVAL TOOL BEFORE FURTHER DISASSEMBLY. DO NOT ATTEMPT TO REMOVE SPRING TENSION ON OLDER MODEL 825'S WITHOUT THE USE OF THIS TOOL. SEE SPRING REMOVAL INSTRUCTIONS.** Newer Models 825, 825D and 825YD assemblies have the disc holder threaded on the stem. Therefore, the seat disc can be removed without releasing spring tension on these newer models.



b. Inspect seat disc for wear or damage. Replace with new seat disc or turn used disc over if new disc is not available.

**NOTE:** The discs are symmetrical. It is usually possible to turn the disc over and obtain an effective seal.

c. If the seat disc has been severely cut along the seat disc ring diameter, the assembly is being subjected to extremely high back pressure from thermal water expansion, water hammer, or other causes of excessive water pressure. A seat disc damaged in this manner should be replaced and not turned over for re-use.

d. Remove disc holder from stem.

**NOTE:** On older Model 825 valves, the disc holder is sealed to the stem with a sealant. If the seal is broken, the stem and holder must be cleaned and new sealant applied. Newer valves, Models 825D and 825YD use an o-ring so a sealant is not required.

### 3. Spring Removal (Sizes 4"-10") (See Figures No. 13 & 14)

**CAUTION:** TO AVOID POSSIBLE INJURY, DO NOT ATTEMPT TO REMOVE SPRING TENSION WITHOUT THE USE OF THE SPRING REMOVAL TOOL SHOWN IN FIGURE NO. 20 ON PAGE 32. ON OLDER MODEL 825 VALVES, IT IS NECESSARY TO REMOVE THE SPRING BEFORE THE RUBBER SEAT DISC CAN BE REMOVED.

a. Leave check assembly in body.

b. Install long studs in body 180 degrees apart.



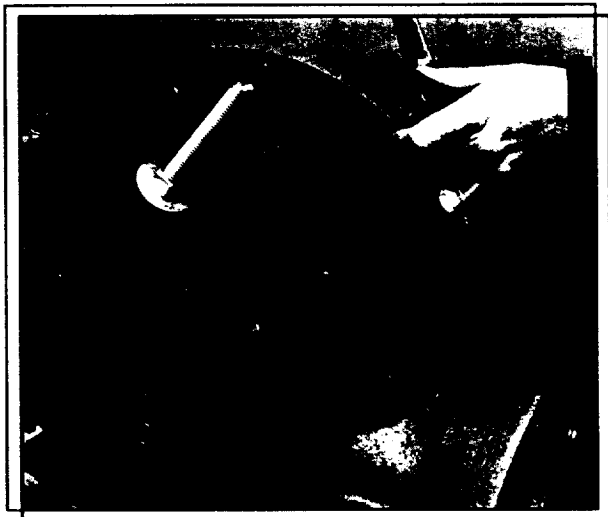
a. Unthread retaining nut from stem and remove disc washer and seat disc.

# Service Procedures

## Models 825, 825D, and 825YD (4" - 10")

c. Place spring removal tool over stud and retain with nuts. (See Figure No.20 for dimensions.)

d. Unthread capscrow (Item 7A) using 9/16" hex socket.



e. Release spring tension by unthreading nuts on long studs. Use alternating turns to keep tool parallel to valve body.

f. Remove spring guide and stem assembly.

g. Remove guide bushing by unthreading.

### **4a. Valve Seat Removal (Sizes 4"-10") Threaded-in Seat Ring Type Model 825 (See Figure No. 13)**

1. Remove check valve as described above.

2. Remove seat ring by unthreading in the counter-clockwise direction. For ease of removal, Figure No. 21 on page 32 defines a simple tool for this purpose.



3. Remove bushing and bushing nut if used (bushing and nut is used on older Model 825).

4. Remove o-ring.

### **4b. Valve Seat Removal (Sizes 4"-10") Bolted in Seat Ring Type Model 825D or 825YD (See Figure No. 14)**

1. Remove check valve as described above.

2. Remove the three capscrows and washers retaining the seat ring.

3. Pull the seat ring from the valve body.

4. Unthread the bushing (Item 2A) from the seat ring.

5. Remove the o-ring.

### **5a. Valve Seat Reassembly (Sizes 4"-10") Threaded-in Seat Ring Type Models Model 825 (See Figure No. 13)**

1. Lubricate o-ring with FDA approved lubricant. Reposition the o-ring in the seat ring groove.

2. Replace the bushing and bushing nut (if used) in the seat ring (the bushing and nut is used on older Model 825).

3. Thread the seat ring into the seating area in a clockwise direction. Be careful not to damage internal epoxy coated surfaces.

### **5b. Valve Seat Reassembly (Sizes 4"-10") Bolted-in Seat Ring Type Models Models 825D & 825YD (See Figure No. 14)**

1. Lubricate o-ring with FDA approved lubricant. Reposition the o-ring in the seat ring groove.

2. Thread the bushing into the seat ring.

3. Place the seat ring carefully into the valve body and retain with three capscrows and washers being careful not to damage the internal epoxy coated surfaces.

### **6. Check Valve Reassembly Models 825, 825D, and 825YD**

a. Use reverse procedure for assembly.

b. Make sure the o-ring is properly placed in the groove. Do not force the cover into the body.

c. Do not damage epoxy coated surfaces.

d. Test unit to insure proper operation.

# Model 825 (2 1/2" - 10") Parts

## CHECK VALVE BODY: MODEL 825

ITEM NO.	DESCRIPTION	QTY. REQ.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
2	Seat Ring	2	780-273	780-274	780-275	780-276	780-277	780-278
2A	Bushing	2	780-280	780-280	780-281	780-281	780-282	780-282
3	Guide	2	****	****	190-001	190-002	190-003	190-004
4	Cover	2	780-306	780-307	780-308	780-309	780-310	780-311
4A	Bushing	2	780-312	780-312	780-313	780-313	780-313	780-313
5	Disc Holder	2	190-013	190-014	190-005	190-006	190-007	190-008
6	Disc Washer	2	190-016	190-017	190-009	190-010	190-011	190-012
7	Stem	2	780-332	780-333	780-334	780-335	780-336	780-337
7A	Screw	2	****	****	511-515-08	511-515-08	511-515-08	511-515-08
7B	Washer	2	****	****	780-338	780-338	780-338	780-338
9	Spring (Outlet)		780-341	780-342	780-343	780-344	780-345	780-346
10	Spring (Inlet)		780-349	780-350	780-351	780-352	780-353	780-354
11	Seat Disc	2	780-357	780-358	780-359	780-360	780-361	780-362
12	O-Ring	2	399-238-72	399-246-72	399-254-72	399-264-72	399-273-72	740-095
13	Capscrew	16	511-516-08	511-516-08	511-517-08	511-519-12	511-520-12	****
13	Capscrew	24	****	****	****	****	****	511-520-14
14	O-Ring	2	398-244-72	398-252-72	398-263-72	398-272-72	398-451-72	740-102
15	Locknut	2	521-547-00	521-547-00	521-550-00	521-550-00	521-551-00	521-551-00
16	Gasket	3	780-365	780-366	780-367	780-368	780-369	780-370
17	Bolt	12	511-019-18	511-019-20	****	****	****	****
17	Bolt	24	****	****	511-019-22	511-020-26	511-020-28	****
17	Bolt	36	****	****	****	****	****	511-021-30
17A	Nut	12	520-019-00	521-019-00	****	****	****	****
17A	Nut	24	****	****	521-019-00	521-020-00	521-020-00	****
17A	Nut	36	****	****	****	****	****	521-021-00
40	Plug Cock	4	781-047	781-047	781-047	781-048	781-048	781-048
41	Nipple	4	571-181-44	571-181-44	571-181-44	571-181-55	571-181-55	571-181-55
50	Air Bleed	4	9594A110	9594A110	9594A110	9594A110	9594A110	9594A110
51	O-Ring	2	399-014-72	399-014-72	399-116-72	399-116-72	399-118-72	399-118-72
121	Relief Valve Assem.	1	902-440L	902-440L	902-446L	902-446L	902-446L	902-446L

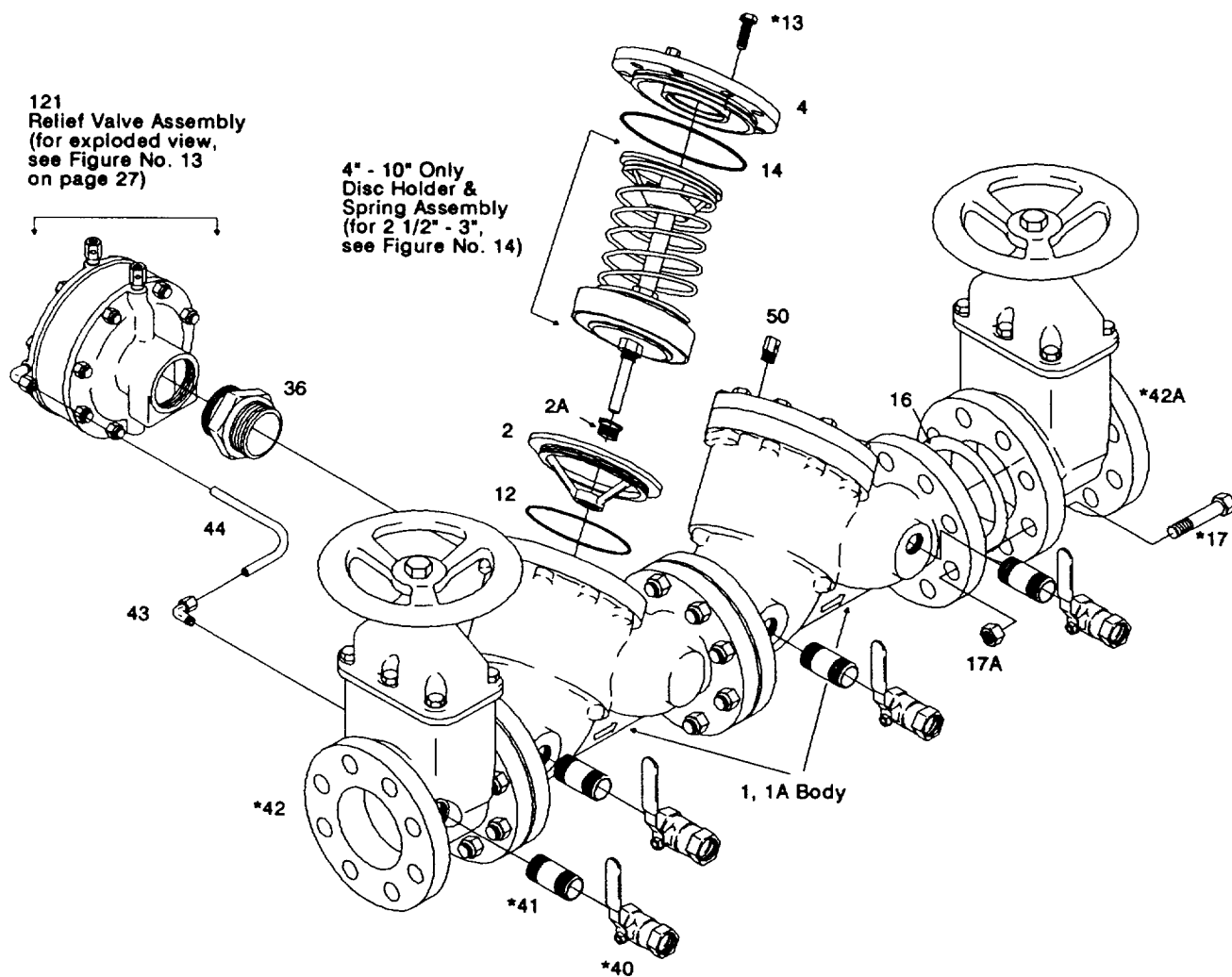
## SHUT-OFFS: MODEL 825

ITEM NO.	DESCRIPTION	QTY.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
42	Resilient Seated NRS (Inlet)	2	781-005	781-006	781-007	781-008	781-009	781-010
42	Resilient Seated OS&Y (Inlet)	2	780-891	780-893	780-895	780-897	780-899	780-901
42A	Resilient Seated NRS (Outlet)	2	781-011	781-012	781-013	781-014	781-015	781-016
42A	Resilient Seated OS&Y (Outlet)	2	780-890	780-892	780-894	780-896	780-898	780-900

## ASSEMBLIES / KITS: MODEL 825

DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
Relief Valve Assembly (121)	902-440L	902-440L	902-446L	902-446L	902-446L	902-446L
Spring Assembly for #1 Check (3,4A,5,6,7,7A,10,11,15,51)	905-085	905-087	902-466	902-468	902-470	902-472
Spring Assembly for #2 Check (3,4,5,6,7,7A,7B,9,10,11,15,51)	905-086	905-088	902-467	902-469	902-471	902-473
Seat Ring Kit (2,2A,12)	902-386	902-385	902-384	902-383	902-382	902-381
Rubber Parts, CI & DI Bodies (11,14)	905-059	905-060	905-061	905-062	905-063	905-064
Relief Valve Kit (Rubber Parts) (26,27,32,39,49 - 2 ea.)	905-066	905-066	905-067	905-067	905-067	905-067
LG Mounting Kit (16,17,17A,40,41,Both Ends)	905-036	905-037	905-038	905-039	905-040	905-041

# Model 825 (2 1/2" - 10") Cast Iron Body Figure No. 13



\* Denotes Commercial Parts Available (see page 33 & 34).  
Some parts are sold in kits only. Consult Parts Price List for  
specifics.

# Model 825 Type D & YD Parts

## CHECK VALVE BODY: MODELS 825D AND 825YD

ITEM NO.	DESCRIPTION	QTY. REQ.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
2	Seat Ring	2	101-145	101-144	101-136	101-137	101-138	101-139
2A	Bushing	2	500-291	500-291	500-292	500-292	780-282	780-282
2C	Washer	6	360-079	360-079	360-078	360-078	360-078	360-078
2D	Capscrew	6	519-513-04	519-513-04	511-514-06	511-514-06	511-514-06	511-514-06
3	Guide	2	****	****	190-001	190-002	190-003	190-004
4	Cover	2	880-023	880-021	880-013	880-014	880-015	880-016
4A	Bushing	2	780-312	780-312	780-313	780-313	780-313	780-313
5	Disc Holder	2	190-013	190-014	190-005	190-006	190-007	190-008
6	Disc Washer	2	190-016	190-017	190-009	190-010	190-011	190-012
7	Stem	2	780-332	780-333	780-334	780-335	780-336	780-337
7A	Screw	2	****	****	511-515-08	511-515-08	511-515-08	511-515-08
7B	Washer	2	****	****	780-338	780-338	780-338	780-338
9	Spring (Outlet)		780-341	780-342	780-343	780-344	780-345	780-346
10	Spring (Inlet)		780-349	780-350	780-351	780-352	780-353	780-354
11	Seat Disc	2	780-357	780-358	780-359	780-360	780-361	780-362
12	O-Ring (Seat Ring)	2	399-237-72	399-242-72	399-253-72	399-263-72	399-272-72	399-274-72
13	Capscrew	16/24	511-516-08	511-516-08	511-517-10	511-519-12	511-520-12	511-520-14
14	O-Ring (Cover)	2	398-346-72	398-354-72	398-365-72	398-374-72	398-379-72	398-381-72
15	Locknut	2	521-547-00	521-547-00	521-550-00	521-550-00	521-551-00	521-551-00
16	Gasket	3	780-365	780-366	780-367	780-368	780-369	780-370
17	Bolt	10	511-019-18	511-019-20	****	****	****	****
17	Bolt	18	****	****	511-019-22	511-020-26	511-020-28	****
17	Bolt	36	****	****	****	****	****	511-021-30
17A	Nut	14	520-019-00	521-019-00	****	****	****	****
17A	Nut	30	****	****	521-019-00	521-020-00	521-020-00	****
17A	Nut	36	****	****	****	****	****	521-021-00
17B	Stud	2	513-019-26	513-019-26	****	****	****	****
17B	Stud	6	****	****	513-019-26	513-020-32	513-020-32	****
39	Nipple	1	573-181-81	573-181-81	573-181-81	573-183-11	573-183-11	573-183-11
40	Plug Cock	4	781-047	781-047	781-047	781-048	781-048	781-048
41	Nipple	3	571-181-44	571-181-44	571-181-44	571-181-55	571-181-55	781-181-55
41A	Nipple	2	571-181-43	781-181-43	781-181-43	571-181-53	781-181-53	781-181-53
41B	Tee		571-131-42	781-131-42	781-131-42	571-131-52	781-131-52	781-131-52
43	Tube Fitting 90°	1	571-231-23	571-231-23	571-231-23	571-231-23	571-231-23	571-231-23
43A	Tube Fitting	1	571-211-23	571-211-23	571-211-23	571-211-23	571-211-23	571-211-23
50	Air Vent	4	9594A110	9594A110	9594A110	9594A110	9594A110	9594A110
51	O-Ring	2	399-014-72	399-014-72	399-116-72	399-116-72	399-118-72	399-118-72

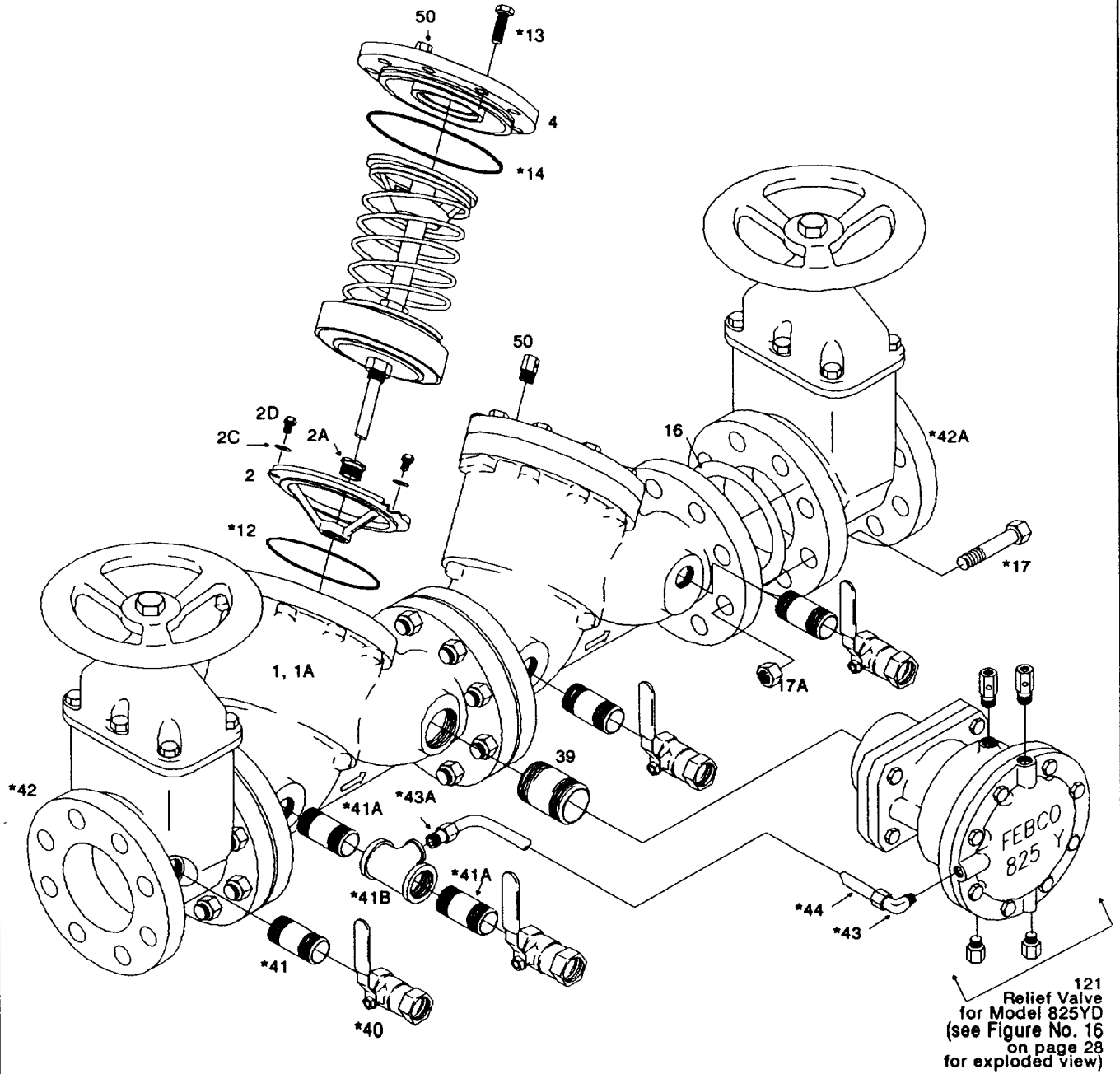
(See page 26 for Assemblies and Kits)

## SHUT-OFFS: MODELS 825D AND 825YD

ITEM NO.	DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
42	Resilient Seated NRS (Inlet)		781-005	781-006	781-007	781-008	781-010
42	Resilient Seated OS&Y (Inlet)		780-891	780-893	780-895	780-897	780-901
42A	Resilient Seated NRS (Outlet)		780-011	781-012	780-013	780-014	780-016
42A	Resilient Seated OS&Y (Outlet)		780-890	780-892	780-894	780-896	780-900

(Parts list continued on page 26)

# Model 825D and 825YD (2 1/2" - 10") Figure No. 14



\* Denotes Commercial Parts Available (see page 33 and 34).  
Some parts are sold in kits only. Consult Parts Price List for specifics.

# Model 825 Type D & YD Parts

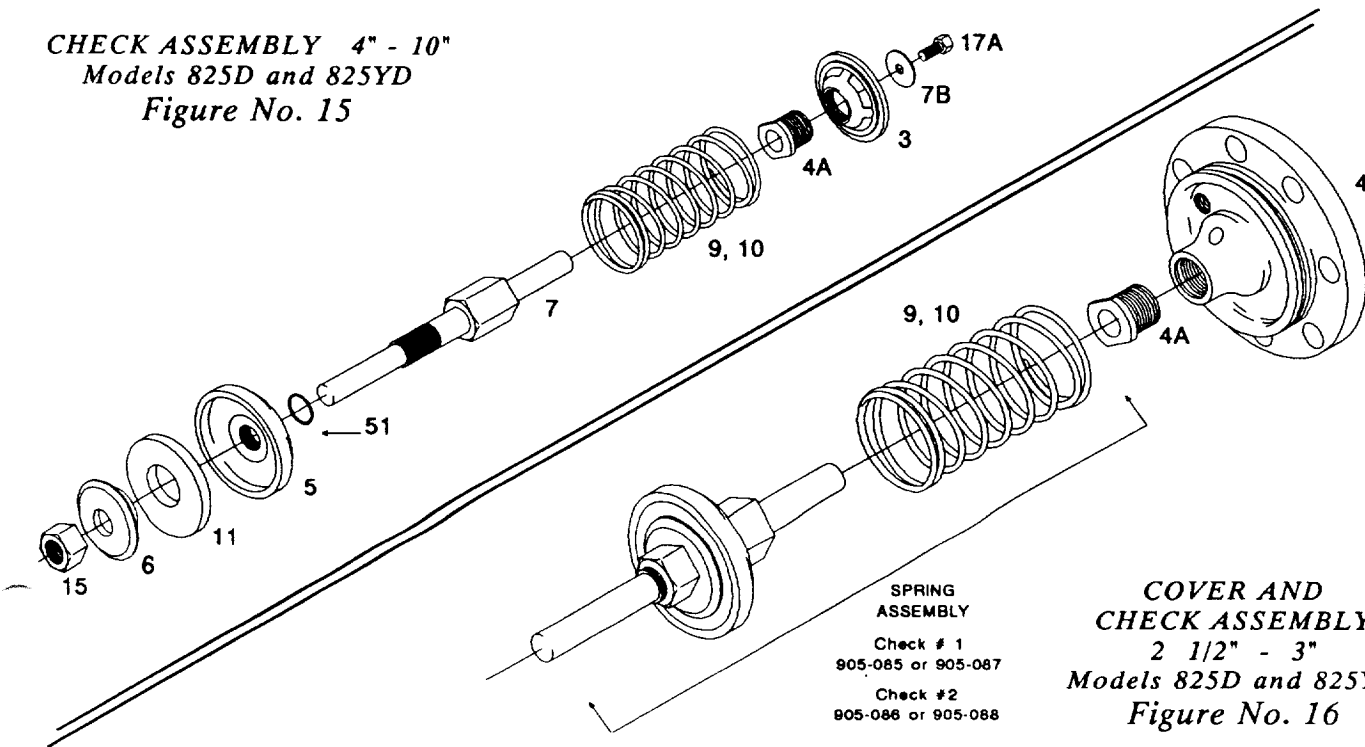
## ASSEMBLIES / KITS: MODEL 825D

DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
Spring Assembly for #1 Check (3,4A,5,6,7,7A,10,11,15,51)	905-085	905-087	902-466	902-468	902-470	902-472
Spring Assembly for #2 Check (3,4A,5,6,7,7A,7B,9,10,11,15,51)	905-086	905-088	902-467	902-469	902-471	902-473
Rubber Parts CI & DI Bodies (11,14)	905-059	905-060	905-061	905-062	905-063	905-064
Relief Valve Assembly (Type D Only)	902-440	902-440	902-440	902-446	902-446	902-446
Relief Valve Kit (26,27,32,39,49 - 2 ..)	905-066	905-066	905-066	905-067	905-067	905-067
LG Mounting Kit (16,17,17A,17B,40,41,Both Ends)	905-036	905-037	905-038	905-039	905-040	905-041

## ASSEMBLIES / KITS: MODEL 825YD

DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
Spring Assembly for #1 Check (3,4A,5,6,7,7A,10,11,15,51)	905-085	905-087	902-466	902-468	902-470	902-472
Spring Assembly for #2 Check (3,4A,5,6,7,7B,9,10,11,15,51)	905-086	905-088	902-467	902-469	902-471	902-473
Seat Ring Kit (2,2A,2C,2D,12)	902-386YD	902-385YD	902-384YD	902-383YD	902-382YD	902-381YD
Rubber Parts CI & DI Bodies (11,14)	905-059	905-060	905-061	905-062	905-063	905-064
LG Mounting Kit (16,17,17A,17B,40,41,Both Ends)	905-036	905-037	905-038	905-039	905-040	905-041
Relief Valve Assembly (Type YD) (21 - 50)	905-100	905-100	905-100	905-101	905-101	905-101
Relief Valve Kit - Rubber (26,27,27A,31A,32)	905-102	905-102	905-102	905-102	905-102	905-102
Relief Valve Seat Ring Kit (22A,22B,36,36A,36B)	905-103	905-103	905-103	905-103	905-103	905-103
Internal Modular Assembly Relief Valve Kit	905-104	905-104	905-104	905-104	905-104	905-104

CHECK ASSEMBLY 4" - 10"  
Models 825D and 825YD  
Figure No. 15



COVER AND  
CHECK ASSEMBLY  
2 1/2" - 3"  
Models 825D and 825YD  
Figure No. 16

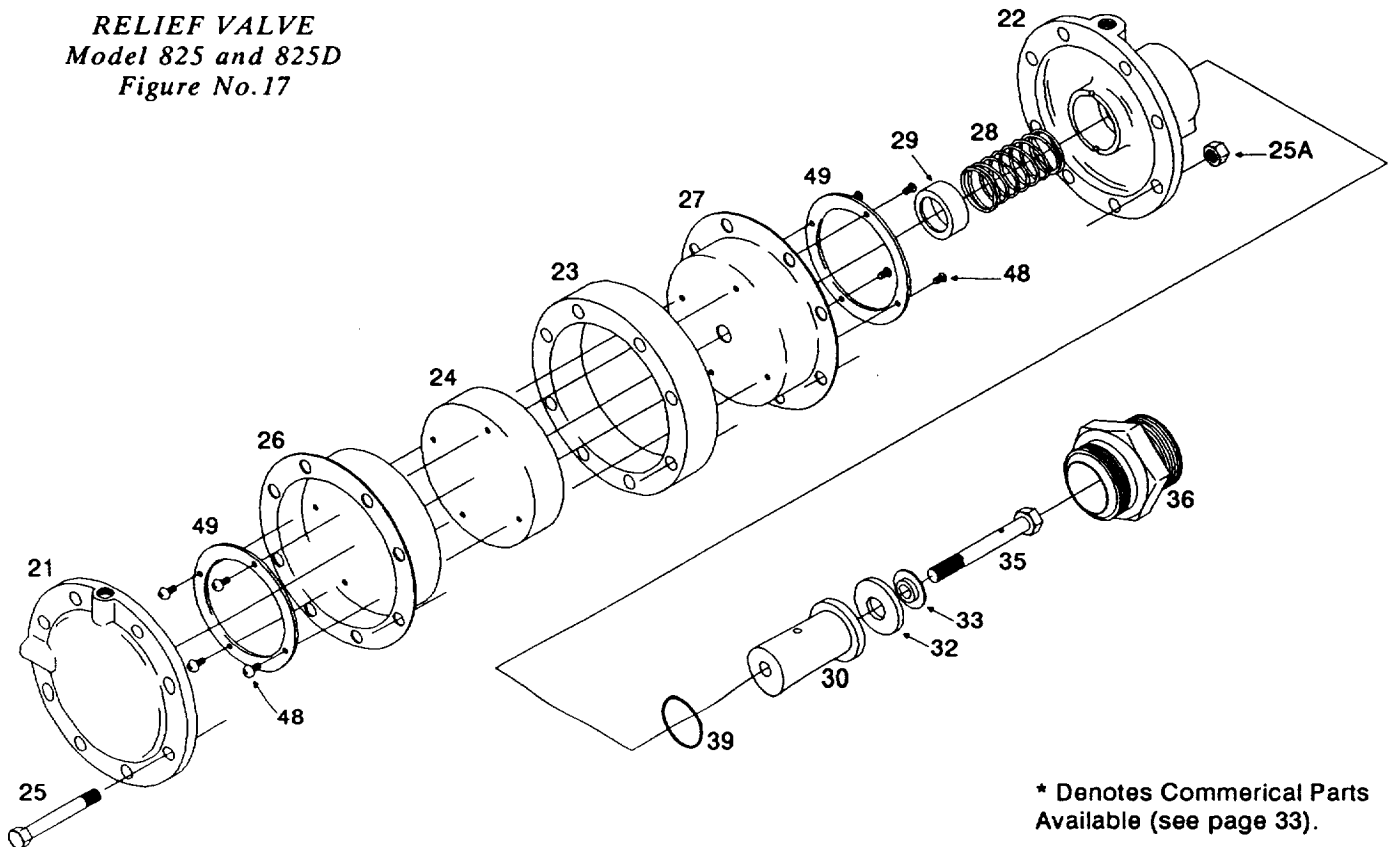


# Model 825 and 825D Parts

## RELIEF VALVE BODY: MODELS 825 and 825D

ITEM NO.	DESCRIPTION	QTY. REQ.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	
21	Diaphragm Cover	1	780-372	780-372	780-372	780-372	780-372	780-372
23	Diaphragm Spacer	1	780-377	780-377	780-377	780-377	780-377	780-377
24	Diaphragm Button	1	780-379	780-379	780-379	780-379	780-379	780-379
25	Bolt	8	511-515-22	511-515-22	511-515-22	511-515-22	511-515-22	511-515-22
25A	Nut	8	521-515-00	521-515-00	521-515-00	521-515-00	521-515-00	521-515-00
26	Diaphragm	1	780-381	780-381	780-381	780-381	780-381	780-381
27	Diaphragm	1	780-383	780-383	780-383	780-383	780-383	780-383
28	Spring	1	780-385	780-385	780-386	780-386	780-386	780-386
29	Spring Button	1	780-388	780-388	780-389	780-389	780-389	780-389
30	Main Stem	1	780-391	780-391	780-392	780-392	780-392	780-392
32	Seat Disc	1	780-394	780-394	780-395	780-395	780-395	780-395
33	Disc Washer	1	780-397	780-397	780-398	780-398	780-398	780-398
35	Orifice Bolt	1	780-399	780-399	780-399	780-399	780-399	780-399
36	Seat Ring (825)	1	780-402	780-403	780-404	780-404	780-405	780-405
36	Seat Ring (825D)	1	780-403	780-403	780-403	780-404	780-405	780-405
39	O-Ring	1	398-222-72	398-222-72	388-330-72	398-330-72	398-330-72	398-330-72
48	Capscrew	8	700-137	700-137	700-137	700-137	700-137	700-137
49	Diaphragm Washer	2	780-415	780-415	780-415	780-415	780-415	780-415

RELIEF VALVE  
Model 825 and 825D  
Figure No.17



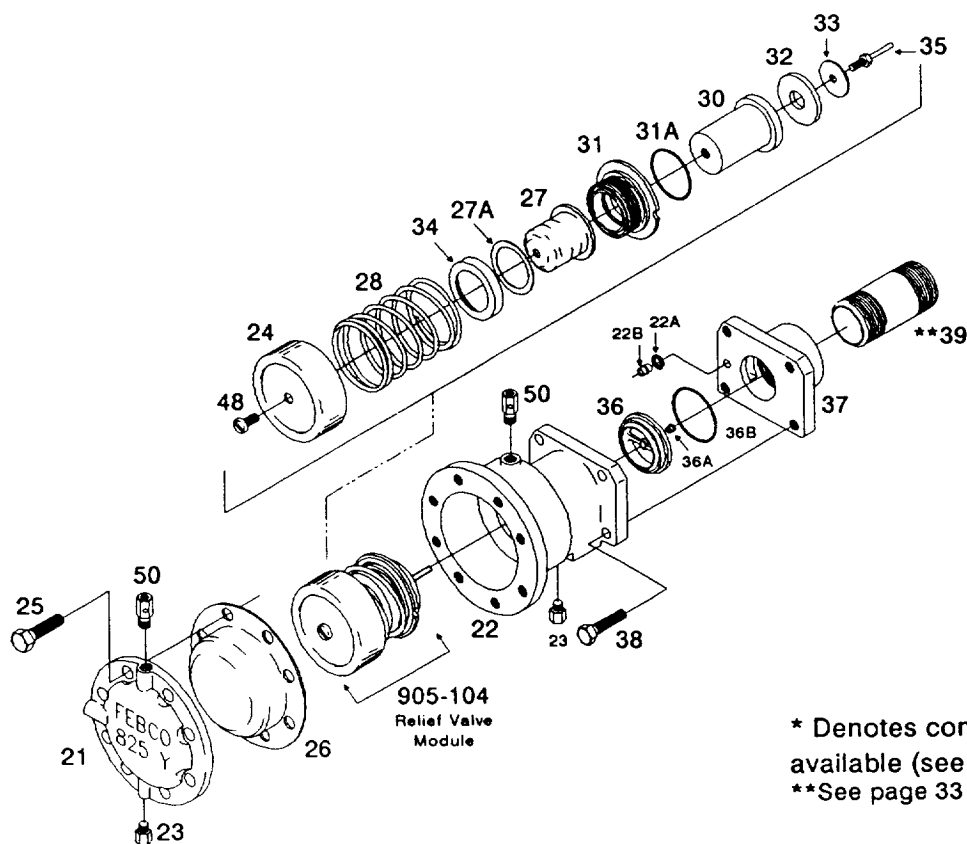
\* Denotes Commerical Parts  
Available (see page 33).

# Model 825 Type YD Parts

## RELIEF VALVE: MODEL 825YD

ITEM NO.	DESCRIPTION	QTY. REQ.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
21	Cover-Relief Valve	1	101-113	101-113	101-113	101-113	101-113	101-113
22	Body-Relief Valve	1	101-112	101-112	101-112	101-112	101-112	101-112
22A	O-Ring	1	398-202-72	398-202-72	398-202-72	398-202-72	398-202-72	398-202-72
22B	Bushing	1	500-290	500-290	500-290	500-290	500-290	500-290
24	Diaphragm Button	1	300-118	300-118	300-118	300-118	300-118	300-118
25	Capscrew	8	511-515-08	511-515-08	511-515-08	511-515-08	511-515-08	511-515-08
26	Diaphragm - Outer	1	400-108	400-108	400-108	400-108	400-108	400-108
27	Diaphragm - Inner	1	400-109	400-109	400-109	400-109	400-109	400-109
27A	Slip Ring	1	340-103	340-103	340-103	340--103	340-103	340-103
28	Spring	1	630-128	630-128	630-128	630-128	630-128	630-128
30	Main Stem	1	500-298	500-298	500-298	500-298	500-298	500-298
31	Upper Guide	1	101-114	101-114	101-114	101-114	101-114	101-114
31A	O-Ring	1	398-145-72	398-145-72	398-145-72	398-145-72	398-145-72	398-145-72
32	Seat Disc	1	780-395	780-395	780-395	780-395	780-395	780-395
33	Disc Washer	1	300-119	300-119	300-119	300-119	300-119	300-119
34	Retainer	1	101-116	101-116	101-116	101-116	101-116	101-116
35	Lower Guide	1	240-102	240-102	240-102	240-102	240-102	240-102
36	Seat Ring	1	101-115	101-115	101-115	101-115	101-115	101-115
36A	Bushing	1	500-229	500-229	500-229	500-229	500-229	500-229
36B	O-Ring	1	399-229-72	399-229-72	399-229-72	399-229-72	399-229-72	399-229-72
37	Mounting Plate	1	101-143	101-143	101-143	101-142	101-142	101-142
38	Capscrew	4	511-514-07	511-514-07	511-514-07	511-514-07	511-514-07	511-514-07
39	Nipple	1	573-181-81	573-181-81	573-181-81	573-183-11	573-183-11	573-183-11
48	Capscrew		519-513-04	519-513-04	519-513-04	519-513-04	519-513-04	519-513-04
50	Air Bleed		9594A110	9594A110	9594A110	9594A110	9594A110	9594A110

RELIEF VALVE  
Model 825YD  
Figure No. 18



\* Denotes commercial parts available (see page 33).  
\*\*See page 33 for size.

# Model 826 Type YD Parts

## RELIEF VALVE WITH BYPASS: MODEL 826YD

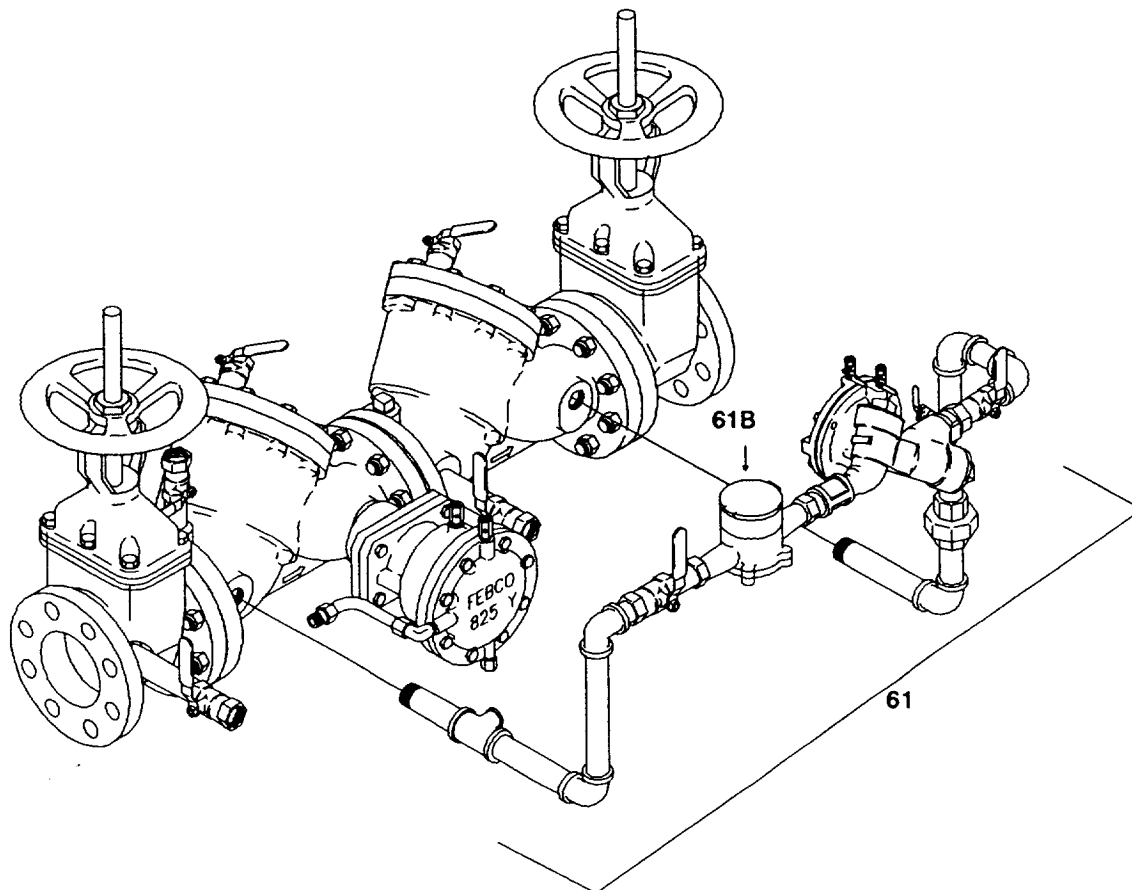
REF DES	DESCRIPTION	2-1/2"	3"	4"	6"	8"	10"
9	1st Check Spring	780-349	780-350	630-142	630-143	630-144	630-145
9	2nd Check Spring	630-140	630-141	780-778	780-779	780-780	780-781
42	Resilient Wedge OS & Y GV	780-891	780-893	780-895	780-897	780-899	780-901
61	Bypass Kit	905-127	905-127	905-127	905-127	905-127	905-127
61B	Meter (Std.-Gal.)	780-666	780-666	780-666	780-666	780-666	780-666

The following information, combined with the information in the 825 Maintenance Manual, gives you all the necessary technical information for the 826YD.

For information on Installation, Servicing, Field Testing and Trouble shooting, please refer to those sections in the this Maintenance Manual.

The items listed below are used only on the Model 826YD and are not interchangeable with the Model 825YD.

*Model 826YD  
Figure No. 19*

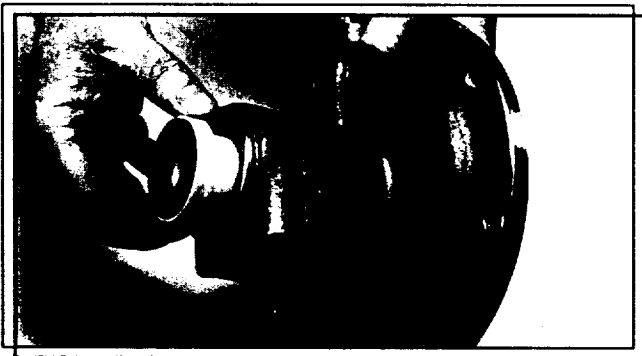


# Service Procedures • Relief Valve

## Models 825, 825D, and 825YD (2 1/2" - 10")

### 1a. Relief Valve Disassembly Non-Modular Type Relief Valve Models 825 & 825D (See Figures No. 13 & 16)

1. Remove copper tubing from relief valve body.
2. Unthread the relief valve completely from the check valve body, leaving the seat ring in the check valve body. NOTE: If the seat ring is removed with the relief valve, the seat ring must be unthreaded from the relief valve diaphragm plate, being careful not to damage the seat ring threads and seating surface.
3. Remove cover bolts and nuts, diaphragm cover and spacer from the relief valve assembly.
4. Turn the relief valve upside down, unthread screw (Item 35) using a 9/16 hex socket, and remove diaphragm assembly, spring button and spring.
5. Unthread screw (Item 48) and remove diaphragm washer and diaphragm from diaphragm button.
6. Push main stem out of bottom of relief valve body.



7. Remove o-ring from body.

### 2a. Relief Valve Reassembly Non-Modular Type Relief Valve Model 825 and 825D (See Figure No. 17)

1. Assemble washer, outer diaphragm, spacer, diaphragm button, inner diaphragm and washer by securing with capscrews to form diaphragm assembly. When installing diaphragms, make sure side of diaphragm marked "button side" (fabric side) is toward diaphragm button and that diaphragm is not pinched.
2. Lubricate mainstem o-ring with FDA approved lubricant. Place seat disc on main stem and place disc washer on seat disc.
3. Slide main stem bolt through main stem assembly and place inside relief valve body cavity with main stem bolt protruding.
4. Position spring over bolt and fit diaphragm assembly over spring. Compress diaphragm assembly into spring until main stem bolt threads into diaphragm assembly. Secure using a torque wrench. **DO NOT TIGHTEN MAINSTEM BOLT BEYOND 15 INCH-LBS. OR DISTORTION OF THE MAIN STEM (ITEM 30) WILL OCCUR.**

5. Thread seat ring into main valve body and thread relief valve into seat ring.

6. Reconnect copper tubing to relief valve.

7. Slowly open inlet shut-off valve and bleed air by opening first testcock #4, then testcocks #3, and #2 and all air bleeds.

8. Slowly open outlet shut-off valve and return the valve to service.

9. Test the assembly to insure it is operating properly.

### 3a. Relief Valve Seat Disc Replacement Modular Type Relief Valve Model Model 825YD (See Figure No. 18)

1. Disconnect sensing tubing. Remove relief valve cover (Item 21) by loosening cover bolts (Item 25) and remove the outer diaphragm (Item 26).

2. Grasp the relief valve button (Item 24) with one hand. Insert fingers into the rectangular relief valve port on the bottom of the relief valve and apply force to the seat disc. Pull the relief valve module straight out from the body. **DO NOT TWIST.**

3. Place the relief valve module on a flat surface. Holding the mainstem with one hand, loosen and remove the lower guide (Item 35) and disc washer (Item 33). Remove the rubber seat disc (Item 32) and turn over or replace as required. Inspect all parts and clean using clean water. Refer to section 5a on replacing



relief valve diaphragms if this procedure is necessary.

4. Replace the disc washer and lower guide and tighten. Lubricate the o-ring (item 31a), with FDA approved lubricant. Insert the relief valve module into relief valve body, using your fingers to help guide the lower guide into the bushing (item 36a) on the relief valve seat ring. Push the module straight in. **DO NOT TWIST.**

5. If the relief valve module does not have a center label piece covering the screw (item 48), inspect the screw for burrs. If a burr is visible, remove or cover burr with a piece of flexible tape. This will protect the surface of the diaphragm.

6. Replace the diaphragm, placing the fabric side

# Service Procedures • Relief Valve

## Models 825, 825D, and 825YD (2 1/2" - 10")

against the button. Work the rolled edge into the space between the module and the body making sure it is not pinched or buckled.

7. Replace the cover, tighten the cover bolts, and



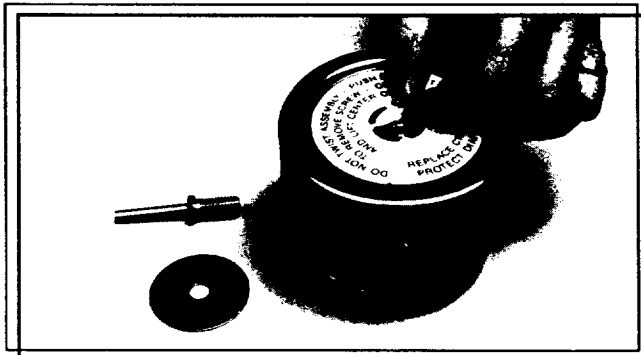
reconnect the sensing tubing. Return to service and test the assembly to insure proper operation.

### 4a. Relief Valve Seat Ring Replacement Modular Type Relief Valve Model 825YD (See Figures No. 14 & 18)

1. Disconnect sensing tubing. Loosen and remove the four mounting bolts (Item 38) from the adapter. Remove the relief valve.
2. Pull the seat ring (Item 36) out from the relief valve body and inspect for damage. Replace as required.
3. Reposition the relief valve to the adapter insuring the o-ring (item 36b) is properly positioned. Tighten the mounting bolts.
4. Reconnect the sensing tubing. Return to service and test the assembly to insure proper operation.

### 5a. Relief Valve Inner Diaphragm Replacement / Modular Type Relief Valve Model 825YD (See Figure No. 18)

1. Disconnect the sensing tubing. Remove the cover (Item 21) by loosening and removing cover bolts (Item 25).
2. Remove the outer diaphragm (Item 26). Grasp the relief valve button (Item 24) with one hand. Insert your fingers into the rectangular relief valve port on the bottom of the relief valve and apply force to the seat disc. Pull the relief valve module straight out **DO NOT TWIST**.
3. Remove the lower guide (item 35) and disc washer (item 33). Place the relief valve module upside down on



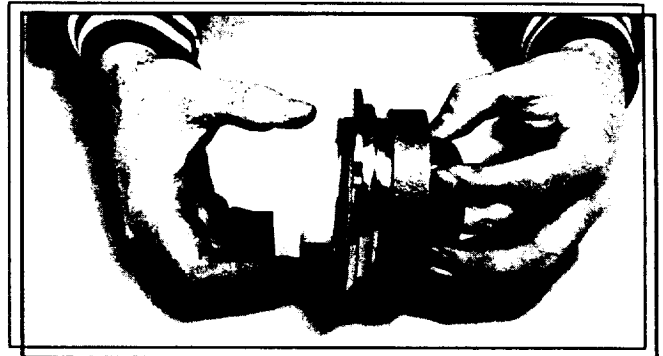
a clean flat surface. Remove the center label piece protecting the screw head and save this piece for reassembly. With one hand apply force sufficient to hold the button against the mainstem. Keep the spring (item 28) compressed (spring is approximately 35 lbs.) while unscrewing the pan head screw (item 48). Remove the screw and relieve the spring tension. Remove the button and spring.

4. Remove the main stem and unthread the retainer (item 34) from the upper guide (Item 32). Remove the slip ring (item 27a) and inner diaphragm (item 27). Inspect, clean and replace parts as required.

5. To reassemble, position the bead on the inner diaphragm into the groove of the upper guide. Place the slip ring over the diaphragm. Lubricate the retainer threads using an FDA approved lubricant and thread the retainer onto the upper guide. Tighten to 60 inch-lbs. of torque.

6. Insert the mainstem into the diaphragm and "roll" the diaphragm into position by grasping the end of the diaphragm and mainstem with one hand and push the upper guide towards your other hand.

7. Test to make sure diaphragm is positioned



properly by sliding the upper guide back and forth through the full travel. It must move freely and easily.

8. Once the inner diaphragm has been rolled, force the end of the mainstem snug against the end of the inner diaphragm. The screw hole in the end of the mainstem should be visible.

9. Replace the spring and button and tighten the screw while holding the button in place.

10. Make sure the screw (item 48) is free of burrs that may cut the outer diaphragm. Reposition the center label piece, that you have saved during disassembly, over the screwhead.

11. Replace the disc washer and lower guide insuring that the seat disc is clean and in position. Lubricate the upper guide o-ring (item 31a) using an FDA approved lubricant, to ease installation. **DO NOT USE LUBRICANT ON ANY OTHER PART.**

12. Position the relief valve module back into the body using your finger to help guide the lower guide into the relief valve seat ring bushing. Push the module straight in. **DO NOT TWIST.**

13. Replace the outer diaphragm, placing the fabric side against the button. Work the rolled edge into the space between the module and the body, making sure it is not pinched or buckled.

14. Replace the cover, tighten the cover bolts, and reconnect the sensing tubing. Return the valve to service and test to insure proper operation.

**Figure No. 20**

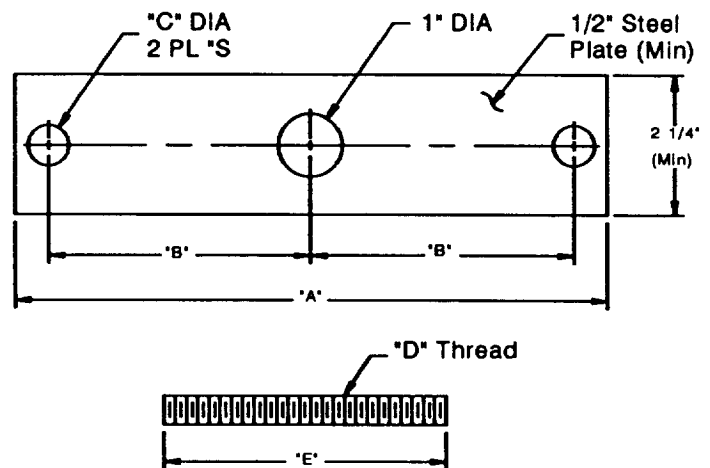
**SPRING REMOVAL TOOL**

DIMENSIONS (INCHES)					
Valve Size	A	B	C	D	E
4"	9 1/2	4 1/4	5/8	1/2 - 13	5 1/2
6"	12 1/2	5 5/8	3/4	5/8 - 11	5 1/2
8"	14 1/4	6 3/8	7/8	3/4 - 10	7
10"	16 1/2	7 1/2	7/8	3/4 - 10	7

**NOTE:** This information is provided to expedite servicing of FEBCO products. One tool may be fabricated for use on all required sizes by drilling all holes at appropriate dimensions in a single steel plate of maximum required length. See page 20 for instructions on use.

To order a FEBCO spring removal tool order part number 905-121.

**CAUTION:** To avoid possible injury during use, do not fabricate tool from lesser strength material or to smaller dimensions than the minimums shown.



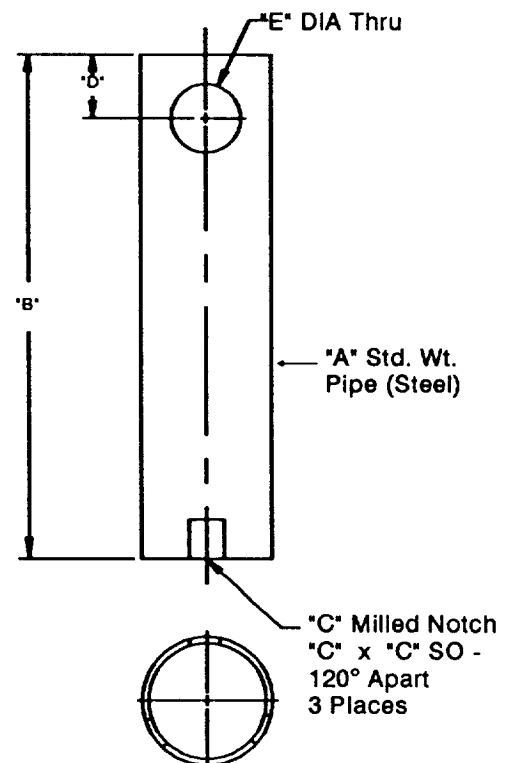
**Figure No. 21**

**SEAT RING TOOL**

*For Model 825 Only.*

DIMENSIONS (INCHES)					
Valve Size	A	B	C	D	E
1 1/2" 1	1/2	6	3/8	3/4	3/4
2" 1	1/2	6	3/8	3/4	3/4
2 1/2" 2	1/2	8	1/2	1	1
3"	3	8	1/2	1	1
4"	4	9	1/2	1	1
6"	6	10	5/8	1	1
8"	8	12	5/8	1	1
10"	8	12	5/8	1	1

**NOTE:** This information is provided to expedite servicing of FEBCO products. See page 21 for instructions on use.



**COMMERCIAL PARTS FOR MAIN VALVE - MODEL 825 (1 1/2" - 10")**

ITEM NO.	DESC.	MATERIAL	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"
2B	BUSHING NUT	ST STL	7/16-20 Hex (2)	9/16-18 Hex (2)	*9/16-18 Hex (2)	*9/16-18 Hex (2)	*7/8-14 Jam (2)	*7/8-14 Jam (2)		
7A	SCREW	ST STL					3/8-16 x 1 (2)	3/8-16 x 1 (2)	3/8-16 x 1 (2)	3/8-16 x 1 (2)
12	O-RING	BUNA-N	568-228 2 1/4 x 2 1/2 x 1/8 (2)	568-231 2 5/8 x 2 7/8 x 1/8 (2)	568-238 3 1/2 x 3 3/4 x 1/8 (2)	568-246 4 1/2 x 4 3/4 x 1/8 (2)	568-254 5 1/2 x 5 3/4 x 1/8 (2)	568-264 7 1/2 x 7 3/4 x 1/8 (2)	568-273 9 3/4 x 10 x 1/8 (2)	10 5/16 x 10 9/16 x 1/8 (2)
13	CAP-SCREW	ST STL	1/2-13 x 1 1/4 (8)	3/8-16 x 7/8 (12)	7/16-14 x 1 (16)	7/16-14 x 1 (16)	1/2-13 x 1 1/4 (16)	5/8-11 x 1 1/2 (16)	3/4-10 x 1 1/2 (16)	3/4-10 x 1 3/4 (24)
14	O-RING	BUNA-N	568-234 3 x 3 1/4 x 1/8 (2)	568-240 3 3/4 x 4 x 1/8 (2)	568-244 4 1/4 x 4 1/2 x 1/8 (2)	568-252 5 1/4 x 5 1/2 x 1/8 (2)	568-263 7 1/4 x 7 1/2 x 1/8 (2)	568-272 9 1/2 x 9 3/4 x 1/8 (2)	568-451 11 x 11 1/2 x 1/4 (2)	12 3/4 x 13 x 1/8 (2)
15	LOCK-NUT	ST STL	3/8-24 (15)	1/2-20 (15)	1/2-20 (15)	1/2-20 (15)	3/4-16 (15)	3/4-16 (15)	7/8-14 (15)	7/8-14 (15)
17	BOLT & NUT	STEEL	1/2-13 x 1 3/4 (12)	5/8-11 x 2 (12)	5/8-11 x 2 1/4 (12)	5/8-11 x 2 1/2 (12)	5/8-11 x 2 3/4 (24)	3/4-10 x 3 (24)	3/4-10 x 3 1/4 (24)	7/8-9 x 3 1/2 (36)
40	TEST- COCK	BRASS	1/4" IPS (4)	1/4" IPS (4)	1/2" IPS (4)	1/2" IPS (4)	1/2" IPS (4)	3/4" IPS (4)	3/4" IPS (4)	3/4" IPS (4)
51	O-RING	BUNA-N			568-014 1/2 x 5/8 x 1/16	568-014 1/2 x 5/8 x 1/16	568-116 3/4 x 15/16 x 3/32	568-116 3/4 x 15/16 x 3/32	568-118 7/8 x 1 1/16 x 3/32	568-118 7/8x1 1/16x3/32

**COMMERCIAL PARTS FOR MAIN VALVE - MODELS 825D & 825YD (2 1/2" - 10")**

ITEM NO.	DESC.	MATERIAL	2 1/2"	3"	4"	6"	8"	10"
2D	CAPSCREW	ST STL	1/4-20 x 1/2 (6)	1/4-20 x 1/2 (6)	5/16-18 x 3/4 (6)	5/16-18 x 3/4 (6)	5/16-18 x 3/4 (6)	5/16-18 x 3/4 (6)
7A	SCREW	ST STL			3/8-16 x 1 (2)	3/8-16 x 1 (2)	3/8-16 x 1 (2)	3/8-16 x 1 (2)
12	O-RING	BUNA-N	568-237 3 3/8 x 3 5/8 x 1/8 (2)	568-242 4 x 4 1/4 x 1/8 (2)	568-253 5 3/8 x 5 5/8 x 1/8 (2)	568-263 7 1/4 x 7 1/2 x 1/8 (2)	568-272 9 1/2 x 9 3/4 x 1/8 (2)	568-274 10 x 10 1/4 x 1/8 (2)
13	CAPSCREW	ST STL	7/16-14 x 1 (16)	7/16-14 x 1 (16)	1/2-13 x 1 1/4 (16)	5/8-11 x 1 1/2 (16)	3/4-10 x 1 1/2 (16)	3/4-10 x 1 3/4 (24)
14	O-RING	BUNA-N	568-346 4 1/8 x 4 1/2 x 3/16 (2)	568-354 5 1/8 x 5 1/2 x 3/16 (2)	568-365 7 x 7 3/8 x 3/16 (2)	568-374 9 1/4 x 9 5/8 x 3/16 (2)	568-379 11 x 11 3/8 x 3/16 (2)	568-381 12 x 12 3/8 x 3/16 (2)
15	LOCK NUT	ST STL	1/2-20 (15)	1/2-20 (15)	3/4-16 (15)	3/4-16 (15)	7/8-14 (15)	7/8-14 (15)
17	BOLT & NUT	STEEL	5/8-11 x 2 1/4 (12)	5/8-11 x 2 1/2 (12)	5/8-11 x 2 3/4 (24)	3/4-10 x 3 (24)	3/4-10 x 3 1/4 (24)	7/8-9 x 3 1/2 (36)
40	TESTCOCK	BRASS	1/2" IPS (4)	1/2" IPS (4)	1/2" IPS (4)	3/4" IPS (4)	3/4" IPS (4)	3/4" IPS (4)
41	NIPPLE		571-181-44 SIZE (3)	571-181-44 SIZE (3)	571-181-44 SIZE (3)	571-181-55 SIZE (3)	571-181-55 SIZE (3)	781-181-55 SIZE (3)
41A	NIPPLE		571-181-43 SIZE (2)	781-181-43 SIZE (2)	781-181-43 SIZE (2)	571-181-53 SIZE (2)	781-181-53 SIZE (2)	781-181-53 SIZE (2)
41B	TEE		571-131-42 SIZE	781-131-42 SIZE	781-131-42 SIZE	571-131-52 SIZE	781-131-52 SIZE	781-131-52 SIZE
43	TUBE FIT. 90°		571-231-23 SIZE	571-231-23 SIZE	571-231-23 SIZE	571-231-23 SIZE	571-231-23 SIZE	571-231-23 SIZE
43A	TUBE FIT.		571-211-23 SIZE	571-211-23 SIZE	571-211-23 SIZE	571-211-23 SIZE	571-211-23 SIZE	571-211-23 SIZE
51	O-RING	BUNA-N	568-014 1/2 x 5/8 x 1/16 (2)	568-014 1/2 x 5/8 x 1/16 (2)	568-116 5/8 x 3/4 x 1/16 (2)	568-116 5/8 x 3/4 x 1/16 (2)	568-118 3/4 x 7/8 x 1/16 (2)	568-118 3/4 x 7/8 x 1/16 (2)

These parts are commercially available through most hardware distributors or retailers. Gate valves, testcocks, flange gaskets, etc., are also commercially available, but not listed. \* Denotes part only used on valves manufactured prior to 1981.

# **COMMERCIAL PARTS FOR RELIEF VALVE - MODELS 825 & 825D (1 1/2" - 10")**

ITEM NO.	DESC.	MATERIAL	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"
25/25A	BOLT & NUT	ST STL	3/8-16 x 2 1/2 (8)	3/8-16 x 2 3/4 (8)	3/8-16 x 2 3/4 (8)	3/8 x 16 x 2 3/4 (8)	3/8-16 x 2 3/4 (8)	3/8-16 x 2 3/4 (8)	3/8-16 x 2 3/4 (8)	3/8-16 x 2 3/4 (8)
39	O-RING	BUNA-N	568-214 1 x 1 1/4 x 1/8	568-222 1 1/2 x 1 3/4 x 1/8	568-222 1 1/2 x 1 3/4 x 1/8	568-222 1 1/2 x 1 3/4 x 1/8	568-330 2 1/8 x 2 1/2 x 3/16	568-330 2 1/8 x 2 1/2 x 3/16	568-330 2 1/8 x 2 1/2 x 3/16	568-330 2 1/8 x 2 1/8 x 3/16
48	CAP-SCREW	ST STL	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)	10-32 x 1/2 Socket Head (8)

## **COMMERCIAL PARTS FOR RELIEF VALVE - MODEL 825YD (2 1/2" - 10")**

ITEM NO.	DESC.	MATERIAL	2 1/2"	2"	4"	6"	8"	10"
22A	O-RING	BUNA-N	568-202 1/4 x 1/2 x 1/8	568-202 1/4 x 1/2 x 1/8	568-202 1/4 x 1/2 x 1/8	568-202 1/4 x 1/2 x 1/8	568-202 1/4 x 1/2 x 1/8	568-202 1/4 x 1/2 x 1/8
25	CAPSCREW	ST STL	3/8-16 x 1 (8)	3/8-16 x 1 (8)	3/8-16 x 1 (8)	3/8-16 x 1 (8)	3/8-16 x 1 (8)	3/8-16 x 1 (8)
31A	O-RING	BUNA-N	568-145 2 9/16 x 2 3/4 x 3/32	568-145 2 9/16 x 2 3/4 x 3/32	568-145 2 9/16 x 2 3/4 x 3/32	568-145 2 9/16 x 2 3/4 x 3/32	568-145 2 9/16 x 2 3/4 x 3/32	568-145 2 9/16 x 2 3/4 x 3/32
36B	O-RING	BUNA-N	568-229 2 3/8 x 2 5/8 x 1/8	568-229 2 3/8 x 2 5/8 x 1/8	568-229 2 3/8 x 2 5/8 x 1/8	568-229 2 3/8 x 2 5/8 x 1/8	568-229 2 3/8 x 2 5/8 x 1/8	568-229 2 3/8 x 2 5/8 x 1/8
38	CAPSCREW	ST STL	5/16-18 x 7/8 Hex (4)	5/16-18 x 7/8 Hex (4)	5/16-18 x 7/8 Hex (4)	5/16-18 x 7/8 Hex (4)	5/16-18 x 7/8 Hex (4)	5/16-18 x 7/8 Hex (4)
39	PIPE NIPPLE	ST STL	1 1/2" IPS x Close	1 1/2" IPS x Close	1 1/2" IPS x Close	2" IPS x Close	2" IPS x Close	2" IPS x Close
48	CAPSCREW	ST STL	1/4-20 x 1/2 Pan Head	1/4-20 x 1/2 Pan Head	1/4-20 x 1/2 Pan Head	1/4-20 x 1/2 Pan Head	1/4-20 x 1/2 Pan Head	1/4-20 x 1/2 Pan Head

## **COMMERCIAL PARTS FOR MAIN VALVE - MODEL 825Y (3/4" - 2")**

ITEM NO.	DESC.	MATERIAL	3/4"	1"	1 1/4"	1 1/2"	2"
4	O-RING	BUNA-N	568-202	568-202	568-202	568-202	568-202
6	CAPSCREW	ST STL	1/4-20 x 5/8 Allen Head	1/4-20 x 5/8 Allen Head	1/4-20 x 5/8 Allen Head	15/16-18 x 3/4 Allen Head	15/16-18 x 3/4 Allen Head
8	O-RING	BUNA-N	568-226	568-226	568-226	568-235	568-235
12	SCREW	ST STL	1/4-28 x 3/8 Pan Head	1/4-28 x 3/8 Pan Head	1/4-28 x 3/8 Pan Head	1/4-28 x 3/8 Pan Head	1/4-28 x 3/8 Pan Head
15	BOLT	ST STL	5/16-18 x 3/4 Hex Head	5/16-18 x 3/4 Hex Head	5/16-18 x 3/4 Hex Head	3/8-16 x 7/8 Hex Head	3/8-16 x 7/8 Hex Head
18	SCREW	ST STL	1/4-20 x 3/8 80° Flat Head	1/4-20 x 3/8 80° Flat Head	1/4-20 x 3/8 80° Flat Head	1/4-20 x 3/8 80° Flat Head	1/4-20 x 3/8 80° Flat Head
22	O-RING	BUNA-N	568-113	568-113	568-113	568-120	568-120
24	O-RING	BUNA-N	568-022	568-022	568-022	568-127	568-127
27	SCREW	ST STL	10-32 x 3/8 Round Head	10-32 x 3/8 Round Head	10-32 x 3/8 Round Head	1/4-20 x 1/2 Round Head	1/4-20 x 1/2 Round Head
28	PLUG	BRASS	1/8" IPS	1/8" IPS	1/8" IPS	1/4" IPS	1/4" IPS
29	GATE VALVE (w/ Side Tap)	BRONZE	3/4" NPT 1/8" IPS Side Tap	1" NPT 1/8" IPS Side Tap	1 1/4" NPT 1/4" IPS Side Tap	1 1/2" NPT 1/4" IPS Side Tap	2" NPT 1/4" IPS Side Tap
30	TESTCOCK	BRONZE	1/8" IPS	1/8" IPS	1/4" IPS	1/4" IPS	1/4" IPS
102	O-RING	BUNA-N	568-019	568-019		568-026	568-026

These parts are commercially available through most hardware distributors or retailers. Gate valves, testcocks, flange gaskets, etc., are also commercially available, but not listed.





Division of CMB Industries

## U.S. Sales Representative Listing

1550 N. Peach Fresno, Calif. 93727

• P.O. Box 8070 Fresno, Calif. 93747

• Fax: (209) 453-9030

WESTERN REGION	Location	Phone	Fax
Controlled Water Sales	Fresno, CA	(209) 435-5600	(209) 435-5625
Frank Products, Inc.	Portland, OR	(503) 248-0541	(503) 248-0753
KKW, Inc.	Hayward, CA	(510) 785-0735	(510) 782-1621
PMR Associates	Chatsworth, CA	(818) 998-0083	(818) 998-3985
Stone-Drew / Ashe & Jones, Inc.	Seattle, WA	(206) 763-2850	(206) 763-0842

CENTRAL REGION	Location	Phone	Fax
Bill Boehnlein Sales	Lakeland, MN	(612) 436-8851	(612) 436-1887
Brown-Miller, Ltd.	Hillside, IL	(708) 544-7500	(708) 544-7553
Dillon Company, Inc.	Denver, CO	(303) 399-5566	(303) 399-2114
PMR Associates	Phoenix, AZ	(602) 243-6075	(602) 268-2980
Donahue-McGuire Sales Agency, Inc.	St. Louis, MO	(314) 664-2122	(314) 664-0767
Dworkin Company, The	Kansas City, MO	(816) 531-2505	(816) 756-0326
Mid-America Sales Group, Inc.	Grimes, IA	(515) 986-9446	(515) 986-3552
OKI Sales, Inc.	Norman, OK	(405) 360-6161	(405) 360-0092
Peak Sales, Inc.	New Berlin, WI	(414) 782-1232	(414) 782-5590
Vemco Sales, Inc.	Great Falls, MT	(406) 727-5335	(406) 727-5997
Woodruff Sales, Inc.	Salt Lake City, UT	(801) 972-3023	(801) 975-9135

NORTHEAST REGION	Location	Phone	Fax
C & C Marketing, Inc.	Binghamton, NY	(800) 333-0977	(607) 773-1637
Closter Bros., Inc.	Bohemia, NY	(516) 563-3900	(516) 563-3937
De Broka & Assoc., Inc.	Sterling Heights, MI	(313) 979-5980	(313) 979-1757
Hosking Assoc., Inc.	Milford, CT	(203) 877-5841	(203) 877-8042
Kerr Marketing Agency	Cleveland, OH	(216) 582-1720	(216) 582-1842
Chesapeake Marketing	Lanham, MD	(301) 577-2164	(301) 577-7189
Mitchell Love Company	King of Prussia, PA	(215) 337-1500	(215) 962-5490
Technical Marketing	Louisville, KY	(502) 425-8051	(502) 425-8170
Shadco, Inc.	Indianapolis, IN	(317) 251-9045	(317) 251-9301

SOUTHEAST REGION	Location	Phone	Fax
C.A. Riner Company, Inc.	Little Rock, AR	(501) 834-1400	(501) 834-1407
Coleman-Russell & Assoc., Inc.	Birmingham, AL	(205) 833-0700	(205) 836-6528
Crouch Sales Company	Antioch, TN	(615) 834-7556	(615) 833-6690
Grant & Associates	Harahan, LA	(504) 733-2999	(504) 733-9485
Colonial Sales Agency	Tampa, FL	(813) 621-3470	(813) 622-7863
Colonial Sales Agency	Pompano Beach, FL	(305) 785-4005	(305) 785-4006
Manufacturers Agents, Inc.	Atlanta, GA	(404) 351-2074	(404) 355-3969
Otto Sales Company	Ashland, VA	(804) 798-2600	(804) 798-1356
SPC Marketing	Monroe, NC	(704) 283-8554	(704) 283-8010
WWIP Corp.	Houston, TX	(713) 699-5778	(713) 699-0842
WWIP Corp.	Dallas, TX	(214) 243-3633	(214) 243-3632

Note: See separate listing for sales representation outside of the United States.

Revised 1/92



**MAINTENANCE MANUAL  
FOR  
DOUBLE CHECK VALVES  
MODELS 805Y, 805YD and 806DCDA**

- *Installation*
- *Trouble Shooting*
- *Servicing*
- *Testing*
- *Parts*

**BACKFLOW PREVENTION SUPPLY**  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

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A division of CMB Industries

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All assemblies are factory tested for proper operation. Any damage or improper operation caused by pipe line debris or improper installation is not included in the product warranty. In case of malfunction or possible warranty claim, DO NOT REMOVE ASSEMBLY FROM LINE. Contact your local Febco Representative or Febco direct at (209) 252-0791.

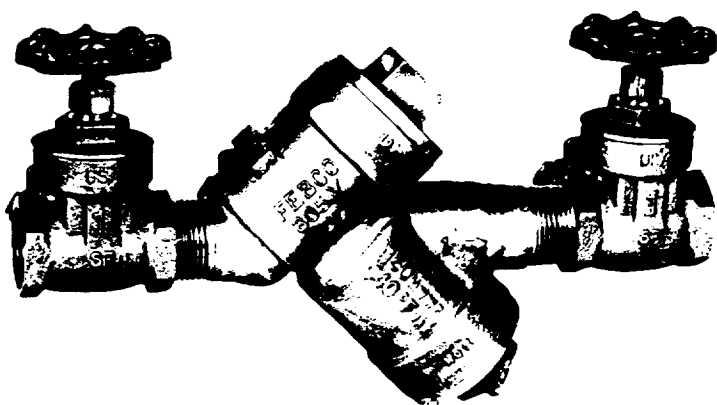
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## OPERATION

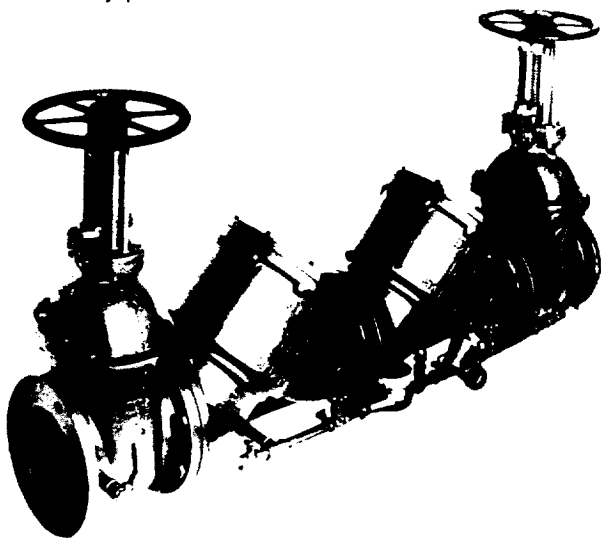
### Model 805Y

This device consists of two independently operating poppet type check valves. Each check valve is spring loaded to maintain a minimum of 1 PSIG differential pressure across the check in a no-flow condition. In a normal flow condition the checks open an amount corresponding to the flow rate. During a backflow (backpressure) situation the seat discs close and seal to prevent any flow reversal.



### Model 806DDC

This device consists of a mainline double check valve with a metered 3/4" by-pass double check valve connected around the mainline checks. The mainline pressure drop is slightly higher than the by-pass, thus all small flow up to the crossover point (approx. 9 GPM) is through the by-pass. Above the crossover point flow is through the mainline and the by-pass.



### Application

The Febco Models 805Y and 806 Double Check Valve assemblies are designed to prevent backflow of polluted water into the potable water system due to pressure reversal (back pressure).

They may be installed in applications where they would be subject to continuous pressure.

They may be installed for applications where back pressure conditions may occur due to elevations or pumps.

Double check valve assemblies generally are not acceptable for use in installations as protection of the potable water system where the possible contaminating material may be toxic or hazardous to health.

Double detector check valve assemblies generally are used only on fire lines.

### Construction

#### Model 805Y

Sizes 3/4" through 2" include two spring-loaded, Y-pattern bronze check valves, two brass gate valves and testcocks for field testing. All valves are threaded type and the unit is shipped completely assembled.

Sizes 2-1/2" through 10" include two spring loaded Y-pattern check valves with epoxy coated cast iron bodies and bronze trim, two cast iron gate valves and testcocks for field testing. All valves are flanged type and the unit is shipped completely assembled.

#### Model 806DDC

The Febco 806DDC Device main line unit consists of two independent, spring loaded, Y-pattern spring loaded check valves, two shutoff valves and four testcocks. The spring loaded poppets in conjunction with soft elastomer discs provide drip tight closure against backflow. The Y-pattern valve design provides low pressure loss at the high flow rates. The shutoff valves are OS&Y type, UL listed for fireline service.

The by-pass line assembly consists of a water meter in series with a Model 805Y 3/4" double check valve. The meter is the total type with accurate registration between 1 and 20 gpm flow rates. The static pressure drop across both checks is approximately 2 PSI less than the mainline check valves.

Consult local codes before installing any Backflow Prevention Device.

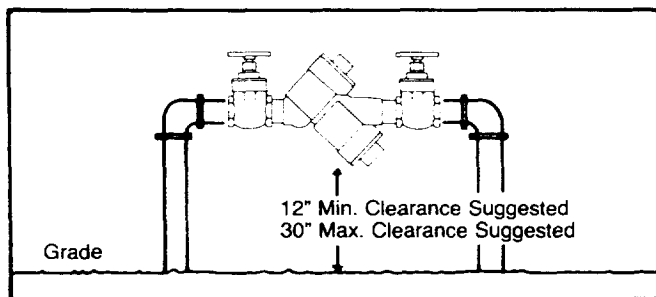
# INSTALLATION INSTRUCTIONS

## MODELS 805Y/806DCDA

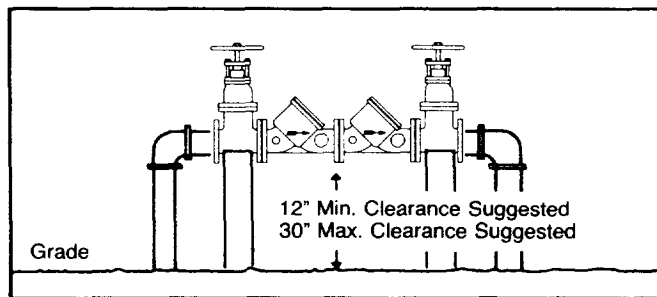
1. The Double Check Valve Assembly must be installed where it is accessible for periodic testing and maintenance.
2. PRIOR TO INSTALLING IN LINE, FLUSH SUPPLY LINE OF ALL FOREIGN MATERIAL. Failure to flush the lines completely may cause the checks to become fouled and require disassembly and cleaning.
3. The device may be installed in a vertical or horizontal position. However, horizontal is recommended as the most desirable for larger sizes for ease of testing and maintenance. Consult local codes for possible restrictions on positioning.
4. When threading the device in line, place wrench only on gate valve hex ends. Keep pipe dope off interior surfaces of valve. On 2-1/2" and larger devices, DO NOT LIFT THE DEVICE WITH GATE VALVE HANDWHEELS OR STEMS. ALSO DO NOT SUPPORT DEVICE FROM ONLY ONE END.
5. After installation, fill device and bleed air from unit. Test to insure proper operation. If either check fails to hold 1.0 PSI, it is most likely due to fouling. The cap must be removed and the seat and/or seat disc cleaned.  
**NOTE: All devices are factory tested for proper operation. Any damage or improper operation caused by pipe line debris or improper installation is not included in the product warranty. In case of malfunction, or possible warranty claim, DO NOT REMOVE DEVICE FROM LINE. Contact your local Febco Representative or Febco Sales direct at (209) 252-0791.**
6. The device must be protected from freezing. Thermal water expansion and/or water hammer downstream of the backflow preventer can cause excessive pressure increases. Excessive pressure situations should be eliminated to avoid possible damage to the system and device.

### Typical Installations

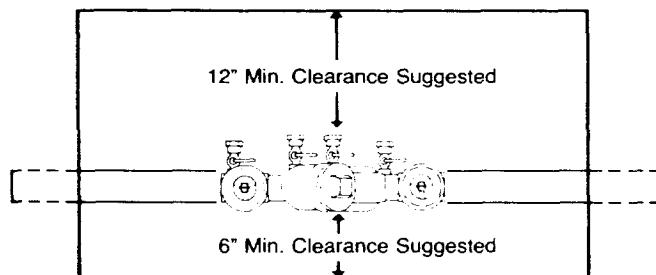
**Outside Installation (Side View)**  
**805Y (Sizes 3/4" through 2")**



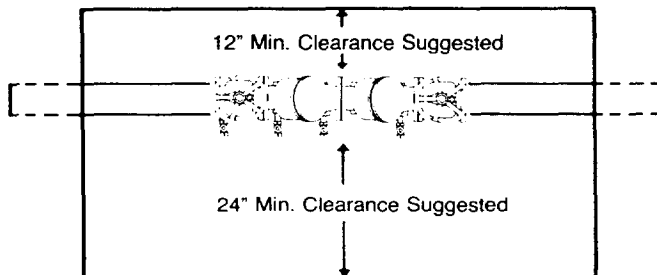
**Outside Installation (Side View)**  
**806DCDA and 805Y (Sizes 2-1/2" and Larger)**



**Pit Installation (Top View)**  
**805Y (Sizes 3/4" through 2")**



**Pit Installation (Top View)**  
**806DCDA and 805Y (Sizes 2-1/2" and Larger)**



## TROUBLE SHOOTING GUIDE

SYMPTOM	CAUSE	SOLUTION
1. Check valve fails to hold 1.0 PSID minimum	<p>a. Debris on sealing surfaces</p> <p>b. Leaking gate valve</p> <p>c. Damaged seat disc or seat ring</p> <p>d. Damaged guide holding check open</p> <p>e. Weak or broken spring</p>	<p>Disassemble and clean</p> <p>Disassemble and clean or repair.</p> <p>Disassemble and replace</p> <p>Disassemble and replace guide pin and/or sleeve bushing</p> <p>Disassemble and replace spring</p>
2. Chatter during flow conditions	a. Worn, damaged or defective guide	Disassemble and repair or replace guide
3. Low flows passing through mainline valve (806DDC only)	<p>a. Mainline check fouled</p> <p>b. Meter strainer plugged</p> <p>c. Damaged mainline seat disc or seat</p> <p>d. Broken mainline spring</p>	<p>Disassemble and clean</p> <p>Disassemble and clean</p> <p>Disassemble and replace</p> <p>Disassemble and replace</p>

## SERVICE PROCEDURE

General service instruction applicable to all sizes.

1. Rinse all parts with clean water prior to assembly.
2. DO NOT USE ANY PIPE DOPE, OIL, GREASE OR SOLVENT ON ANY PARTS unless instructed to do so.
3. Do not force parts. Parts should fit freely together. Excess force may cause damage and render the device inoperable.
4. Carefully inspect seals, seating surfaces, etc. for damage or debris.
5. Test unit after servicing to insure proper conditions.
6. Refer to applicable parts list and figures for visual aid information.
7. Tables 1, 2 and 3 provide size and material information for standard parts (non-special design). These parts can usually be purchased locally, rather than special order from the factory.
8. Some water conditions can cause a build-up of calcium or similar material deposits on some moving parts. Normally this condition would not occur on devices used in systems with varying flow rates. The scraping action of moving parts helps to remove any deposits. However, with devices used on static systems such as firelines, any deposits would not be scraped away and could interfere with the check valve operation. Devices in these applications should be disassembled and inspected on a periodic basis depending on water quality. Any deposits should be removed from the center guiding stem and bushings. Use care to avoid damage to guiding surfaces.

---

## A. **MODEL 805Y** *3/4" through 2" sizes (Figure 1)*

---

### 1. **Disassembly – Check Valves**

---

- a. Close inlet and outlet gate valves. Bleed residual pressure by opening No. 2, 3 and 4 testcocks.
- b. Unscrew cap using appropriate size wrench. NOTE: Cap is spring loaded.
- c. Remove the spring and check assembly.
- d. If any calcium or similar material has built-up on the inside surfaces of the guidehole on the cap, it can be removed with careful use of a standard reamer.
  - (1) 3/4" through 1-1/4" devices:  
.6250 (5/8) Reamer
  - (2) 1-1/2" and 2" devices:  
.8750 (7/8) Reamer

### 2. **Check Valve Seal Replacement**

---

- a. Hold check assembly in one hand and remove screw, washer, and seat disc.  
**CAUTION: The use of pliers or other tools may damage the parts and require unnecessary replacement. Do not scratch or mark seating or guiding surfaces.**
- b. Install new disc after cleaning disc holder.
- c. Positioning disc washer and retain with screw.

### 2. **Assembly**

---

- a. Use reverse procedure for assembly with the following special instruction.
- b. To ease cap installation, apply a thin coating of O-ring lubricant or white petroleum jelly to the O-ring prior to assembly.
- c. Test unit to insure proper operation.

---

## B. **MODEL 805Y** *2-1/2" through 3" sizes (Figure 2)*

---

### 1. **Disassembly – Check Valve**

---

- a. Close outlet gate valve and inlet gate valve. Bleed residual pressure by opening No. 2, 3 and 4 testcocks.
- b. Remove cover bolts uniformly while holding cover in place. Remove cover.

**CAUTION: Spring is retained in body by cover.**

- c. Lift spring and check assembly from body.
- d. Unscrew bushing (Item 4A) from cover.

### 2. **Check Assembly Repair**

---

- a. Unscrew nut on stem and remove disc washer and seat disc.

### 3. **Valve Seat Removal** (Figure 2)

---

- a. Remove seat ring by unscrewing in counter-clockwise direction.
- b. Remove bushing and bushing nut (Item 2A and 2B).
- c. Remove O-Ring.

### 4. **Assembly - Check Valve**

---

- a. Use reverse procedure for assembly.
- b. NOTE: On older valves the disc holder is sealed to the stem with permatex. If seal is broken, the stem and holder must be cleaned and new sealant applied.  
Newer valves use an O-Ring and permatex is not required.
- c. Do not apply any grease or oil on the rubber seat disc.
- d. Do not damage epoxy coating.
- e. Test unit to insure proper operation.

---

## C. **MODEL 805Y** *4" through 10" sizes (Figure 2)*

---

### 1. **Check Valve Disassembly**

---

- a. Close outlet gate valve then close inlet gate valve. Bleed residual pressure by opening No. 2, 3, and 4 testcocks.
- b. Remove cover bolts and cover. Unscrew bolts uniformly to avoid binding of the cover. The spring will push the cover approximately 1/2 inch off the top of the valve body.

### 2. **Check Assembly Repair**

---

- a. Leave check assembly in body.
- b. Install long studs in body 180° apart.  
(See figure 4)
- c. Place spring removal tool over stud and retain with nuts. (See Figure 4 for dimensions).

**CAUTION: To avoid possible injury, do not attempt to remove spring tension without the use of this tool.**

**NOTE: Newer devices have the disc holder threaded on the stem. Therefore, the seat disc can be removed without releasing spring tension. Threaded disc holders have four (4) cast lugs, (6 lugs on 10" devices), 1/2" high located on back side, outside the spring diameter. If the device being serviced does not have these lugs, spring tension must be released before further disassembly.**

- d. Unscrew capscrew (7A) using 9/16" hex socket.
- e. Release spring tension by unscrewing nuts on long studs. Use alternating turns to keep tool parallel to valve body.
- f. Remove spring guide and stem assembly.
- g. Remove seat disc by unscrewing nut on stem.
- h. Remove guide bushing by unscrewing.

### 3. Valve Seat Removal *(Figure 5)*

---

- a. Disassemble check valve.
- b. Remove seat disc ring by unscrewing in counter-clockwise direction. For ease of removal, Figure 5 defines a simple tool for this purpose.
- c. Remove bushing and bushing nut.
- d. Remove O-ring.

### 4. Check Valve Assembly

---

- a. Use reverse procedure for assembly.
  - b. Do not damage epoxy coating.
  - c. Test unit to insure proper operation.
- 

## D. MODEL 806DCDA *(Figure 3)*

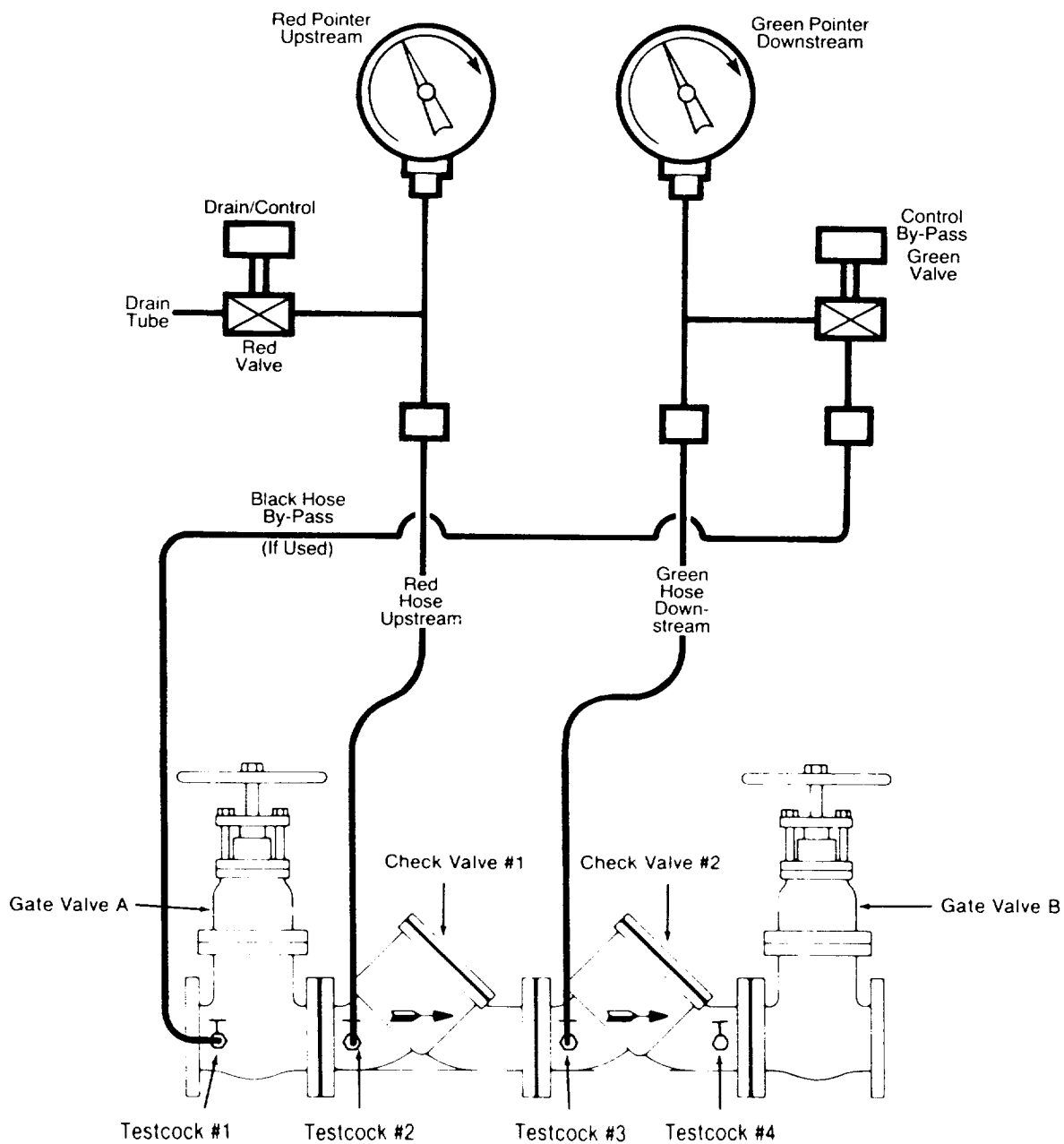
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This device is serviced using the same procedures as the Model 805Y with the following exceptions:

- a. Mainline springs are retained on the disc holder with a clamp.
- b. The meter is removed by loosening the two union nuts. For specific meter service information contact the manufacturer or their representative directly.
- c. Remove and clean in-line strainer mounted in the meter inlet port.
- d. Test unit after reassembling to insure proper operation.



## FIELD TESTING PROCEDURE



**Model 805Y Double Check Valve Assembly**

## FIELD TESTING PROCEDURE \*

---

### TEST NO. 1:

**Purpose:** To test No. 1 check valve for tightness against reverse flow.

**Requirement:** The valve shall be tight against reverse flow under all pressure differentials.

**Steps:**

- a. Connect one gage hose to test cock #2 and connect the other gage hose to test cock #3.
- b. Open test cocks and vent hoses.
- c. Close #2 shut-off valve; then close #1 shut-off valve.
- d. By means of the needle valve lower the pressure at test cock #2 about 2 PSI below the pressure at test cock #3. If this small difference can be maintained then check valve #1 is reported as "tight" or "OK." If this small difference cannot be maintained proceed to the confirm test—Step e., etc.
- e. Open shut-off valve #1 to repressurize the device.
- f. Attach a bleed hose from test cock #1 to the needle valve of test #3 and vent the hose.
- g. Close #1 shut-off valve.
- h. Before tightening the bleed hose use the needle valve on test cock #3 to lower the pressure in the device about 10 PSI below normal line condition; then tighten the bleed hose.
- i. Simultaneously open both needle valves very slowly. If the gage shows that a greater pressure differential is created then the check valve is reported as "tight" or "OK." If a pressure differential is not maintained then the check valve is reported as "leaking" and the amount of leakage is visible as the discharge from the upstream needle valve.
- j. Close all test cocks, remove all equipment and reopen shut-off valves.

### TEST NO. 2:

**Purpose:** To test No. 2 check valve for tightness against reverse flow.

**Requirement:** The valve shall be tight against reverse flow under all pressure differentials.

**Steps:**

- a. Connect one gage hose to test cock #3 and connect the other gage hose to test cock #4.
- b. Open test cocks and vent hoses.
- c. Close #2 shut-off valve; then close #1 shut-off valve.
- d. By means of the needle valve lower the pressure at test cock #3 about 2 PSI below the pressure at test cock #4. If this small difference can be maintained then check valve #2 is reported as "tight" or "OK." If this small difference cannot be maintained proceed to the confirm test—Step e., etc.
- e. Open shut-off valve #1 to repressurize the device.
- f. Attach a bleed hose from test cock #1 to the needle valve of test #4 and vent the hose.
- g. Close #1 shut-off valve.
- h. Before tightening the bleed hose use the needle valve on test cock #4 to lower the pressure in the device about 10 PSI below normal line condition; then tighten the bleed hose.
- i. Simultaneously open both needle valves very slowly. If the gage shows that a greater pressure differential is created then the check valve is reported as "tight" or "OK." If a pressure differential is not maintained then the check valve is reported as "leaking" and the amount of leakage is visible as the discharge from the upstream needle valve.
- j. Close all test cocks, remove all equipment and reopen shut-off valves.

## Model 806DCDA Double Check Detector Assembly

---

This device is tested with the same procedure as the Model 805Y. However, the by-pass double check valve must be isolated from the mainline valve using the 3/4" gate valves during the test.

### Proper By-Pass Operation

**Method 1** — If a differential pressure gauge is used to measure pressure drop across each check, the total mainline drop (both checks) should exceed the total drop of the by-pass double check. Then the by-pass will open before the mainline.

**Method 2** — Flow 3 GPM through the by-pass by opening the mainline testcock #4 (1/2" or 3/4" ball valve). Use the flow meter for this measurement (1 gallon flow in a 20 second time period). After the flow rate has been set, collect the discharge flow in a container for 20 seconds. The volume of water collected should be one gallon.

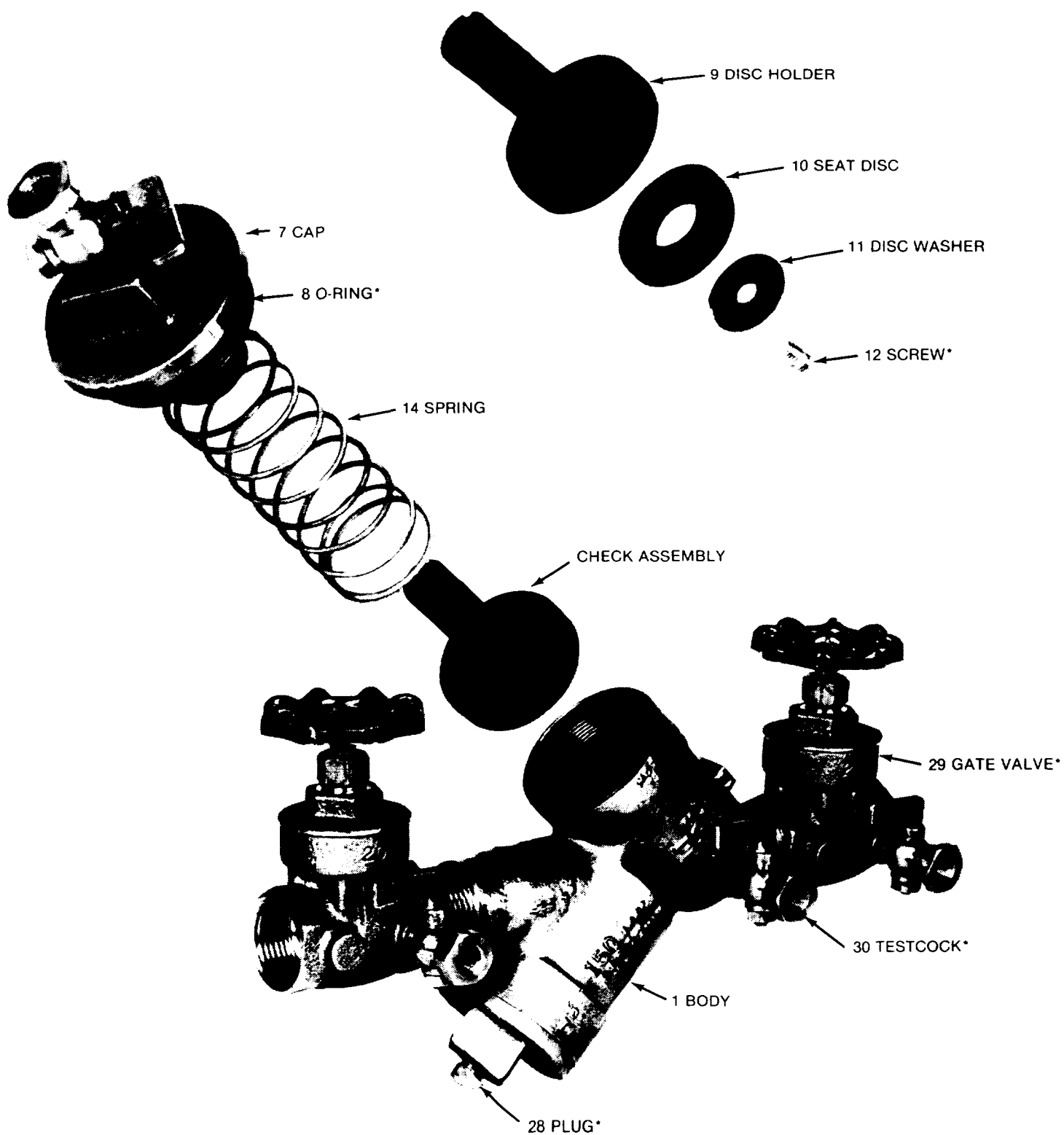
### Restore Operation

After testing restore all valves to their original positions.

\* These are suggested typical test methods. Check with your local code for approved test procedures in your area.

## MODEL 805Y PART NUMBERS SIZES 3/4" to 2"

FIG. NO.	DESCRIPTION	QTY.	SIZE 3/4"	SIZE 1"	SIZE 1-1/2"	SIZE 2"
7	Cap	2	101-028	101-028	101-034	101-034
8	O-ring	2	398-226-72	398-226-72	398-235-72	398-235-72
9	Disc Holder	2	500-270	500-270	500-278	500-278
10	Seat Disc	2	400-099	400-099	400-103	400-103
11	Washer	2	300-084	300-084	300-108	300-108
12	Screw	2	516-543-03	516-543-03	516-543-03	516-543-03
14	Spring	2	630-115	630-115	630-118	630-118
<b>Shut-offs</b>						
29	Gate Valve - Inlet	1	780-659	780-660	780-662	780-663
29	Ball Valve - Inlet	1	781-053	781-054	781-056	781-057
29	Gate Valve - Outlet	1	780-131	780-106	780-108	780-109
29	Ball Valve - Outlet	1	781-048	781-049	781-051	781-052
30	Testcock	4	781-074	781-074	781-075	781-075
<b>Assemblies/Kits</b>						
	<b>Rubber Parts</b> (8, 10-2 ea.)	...	905-042	905-042	905-053	905-053
	<b>Check Assembly</b> (8, 9, 10, 11 and 12)	...	905-044	905-044	905-055	905-055



**FIGURE 1**

\*COMMERCIAL PARTS

## MODEL 805YD PART NUMBERS SIZES 2-1/2" to 10"

FIG. NO.	DESCRIPTION	QTY.	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
2	Seat Ring	2	101-145	101-144	101-136	101-137	101-138	101-139
2A	Bushing	2	780-280	780-280	780-281	780-281	780-282	780-282
2B	Seat Ring Screws (Not Shown)	8	...	...	...	...	...	...
3	Guide	2	...	...	190-001	190-002	190-003	190-004
4	Cover	2	880-094	880-095	880-081	880-082	880-083	880-084
4A	Bushing	2	780-312	780-312	780-313	780-313	780-313	780-313
5	Disc Holder	2	190-013	190-014	190-005	190-006	190-007	190-008
6	Disc Washer	2	190-016	190-017	190-009	190-010	190-011	190-012
7	Stem	2	780-332	780-333	780-334	780-335	780-336	780-337
7A	Screw	...	...	...	511-515-08	511-515-08	511-515-08	511-515-08
7B	Washer	2	...	...	780-338	780-338	780-338	780-338
9	Spring	...	780-341	780-342	780-343	780-344	780-345	780-346
11	Seat Disc	2	780-357	780-358	780-359	780-360	780-361	780-362
12	O-Ring	2	399-238-72	399-246-72	399-254-72	399-264-72	399-273-72	740-095
13	Capscrew	16	511-516-08	511-516-08	511-517-10	511-519-12	511-520-12	...
13	Capscrew	24	...	...	...	...	...	511-520-14
14	O-Ring	2	398-244-72	398-252-72	398-263-72	398-272-72	398-451-72	740-102
15	Locknut	2	521-547-00	521-547-00	521-550-00	521-550-00	521-551-00	521-551-00
16	Gasket	3	780-365	780-366	780-367	780-368	780-369	780-370
17	Bolt	12	511-019-18	511-019-20	...	...	...	...
17	Bolt	24	...	...	511-019-22	511-020-26	511-020-28	...
17	Bolt	36	...	...	...	...	...	511-021-30
17A	Nut	12	521-019-00	521-019-00	...	...	...	...
17A	Nut	24	...	...	511-019-00	521-020-00	521-020-00	...
17A	Nut	36	...	...	...	...	...	521-021-00
40	Bal Valve	4	781-047	781-047	781-047	781-048	781-048	781-048
41	Nipple (Not Shown)	4	571-181-44	571-181-44	571-181-44	571-181-55	571-181-55	571-181-55
<b>Gate Valves</b>								
42	Resilient Seated NRS-Inlet	...	781-005	781-006	781-007	781-008	781-009	781-010
42	Resilient Seated OS&Y-Inlet	...	780-891	780-893	780-895	780-897	780-899	780-901
42A	Resilient Seated NRS-Outlet	...	781-011	781-012	781-013	781-014	781-015	781-016
42A	Resilient Seated OS&Y-Outlet	...	780-890	780-892	780-894	780-896	780-898	780-900
50	Aircock	2	780-416	780-416	780-416	780-416	780-416	780-416
51	O-Ring	2	399-014-72	399-014-72	399-116-72	399-116-72	399-118-72	399-118-72
<b>Assemblies/Kits</b>								
	<b>Spring Assembly</b> (3, 4A, 5, 6, 7, 7A, 7B, 9, 11, 15 and 51)	...	905-086	905-088	902-467	902-469	902-471	902-473
	<b>Rubber Parts</b> (11 and 14)	...	905-059	905-060	905-061	905-062	905-063	905-064
	<b>Seat Kit</b> (2, 2A, 2B and 12)	...	902-386YD	902-385YD	902-384YD	902-383YD	902-382YD	902-381YD
	<b>Lg. Mounting Kit</b> (16, 17, 17A; Both Ends)	...	905-036	905-037	905-038	905-039	905-040	905-041

ITEMS NOT SHOWN:  
40 TESTCOCK  
41 NIPPLE

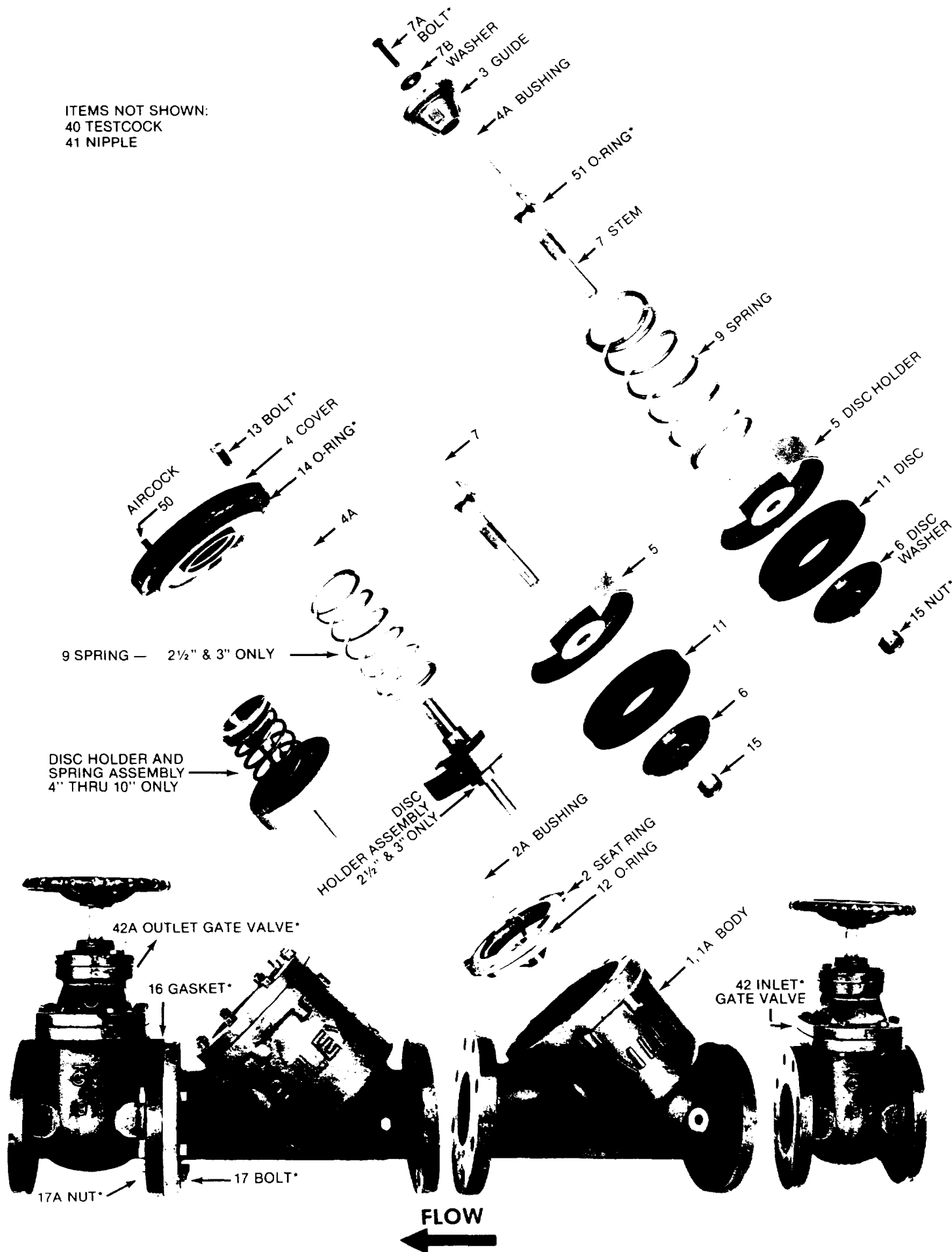
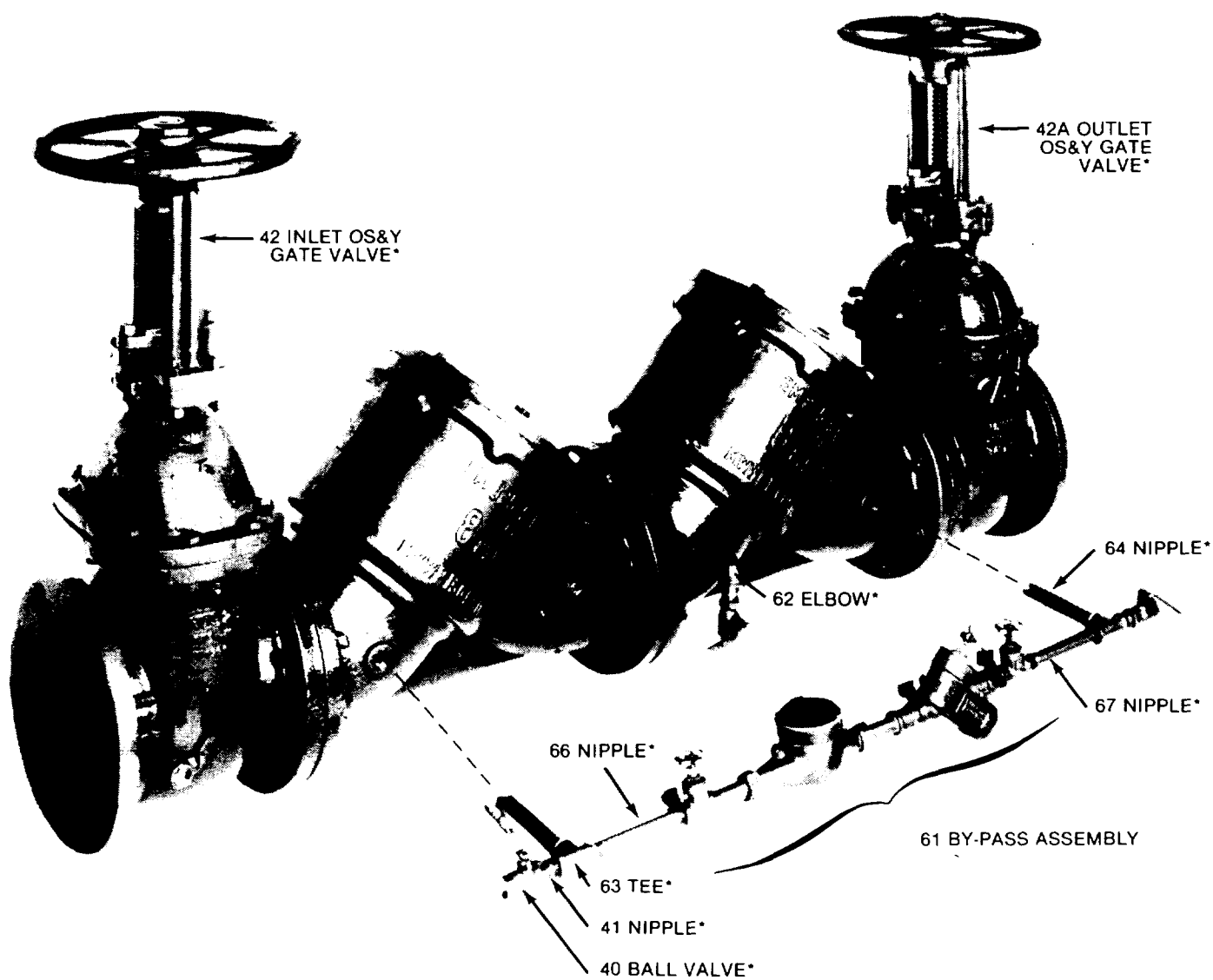


FIGURE 2

## MODEL 806DCDA PART NUMBERS SIZES 4" to 10"

FIG. NO.	DESCRIPTION	QTY.	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
9	Spring	2	780-778	780-779	780-780	780-781
<b>Gate Valves</b>						
42	Metal Seated OS&Y-Inlet	1	780-925	780-927	780-928	780-929
42	Resilient Seated OS&Y-Inlet	1	780-895	780-897	780-899	780-901
42A	Metal Seated OS&Y-Outlet	1	780-925	780-927	780-928	780-929
42A	Resilient Seated OS&Y-Outlet	1	780-894	780-896	780-898	780-900
61	Inlet By-Pass Sub Assembly	1	902-503	902-503	902-503	902-503
61	Center By-Pass Sub Assembly	1	902-504	902-603	902-604	902-605
61	Outlet By-Pass Sub Assembly	1	902-505	902-505	902-505	902-505
61B	Meter (Std.-Gal.)	1	780-666	780-666	780-666	780-666
	Mainline Spring Assembly	2	902-514	902-515	902-516	902-517

**NOTE: Refer to 805 and 805Y for part numbers of all other parts.  
The items listed above are used only on the Model 806DCDA and  
are not interchangeable with the Model 805Y.**



61A COUPLING/ADAPTOR  
 61B METER  
 61C COUPLING  
 61D 805Y-3/4 LG

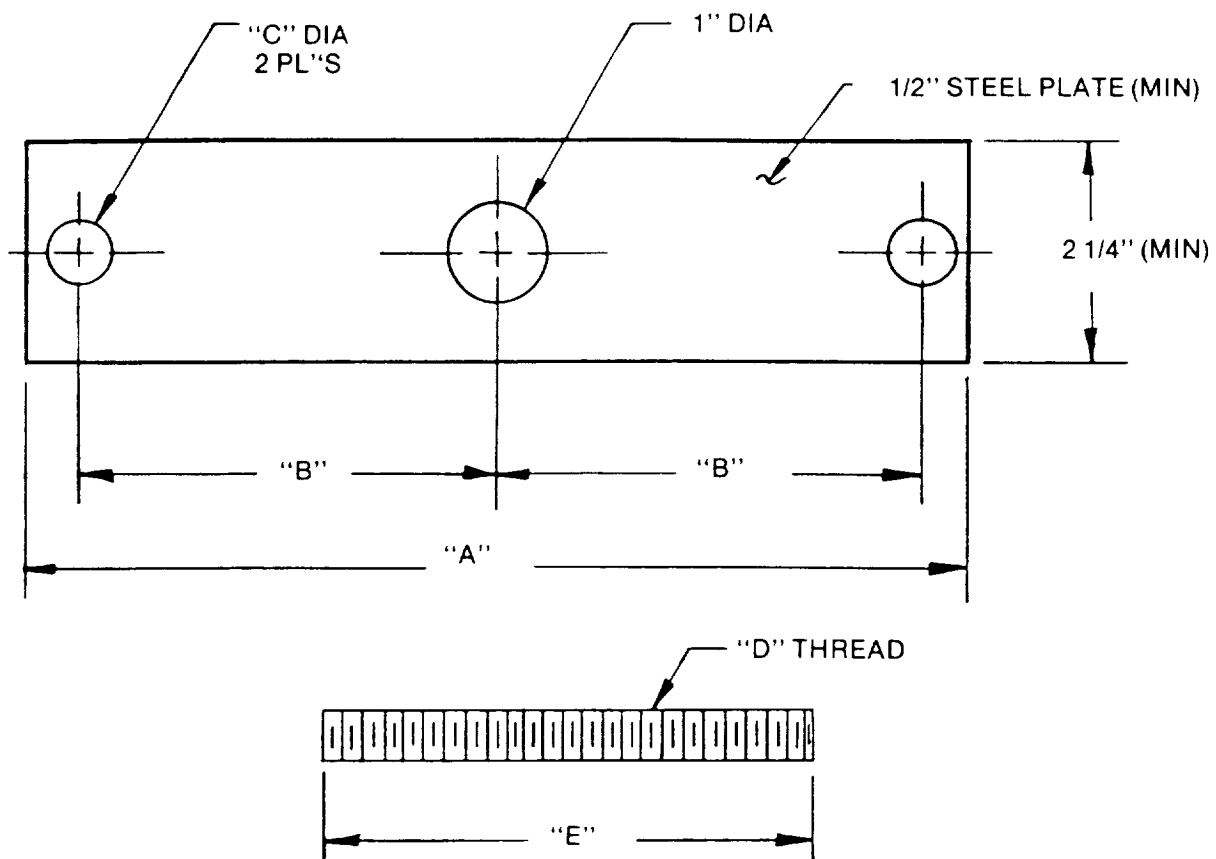
ITEMS NOT SHOWN:  
 65 REDUCING BUSHING (2)  
 (806-4" ONLY)

**FIGURE 3**

\*COMMERCIAL PARTS



## SPRING REMOVAL TOOL



DIMENSIONS					
VALVE SIZE	A	B	C	D	E
4"	9 1/2	4 1/4	5/8	1/2-13	5 1/2
6"	12 1/2	5 5/8	3/4	5/8-11	5 1/2
8"	14 1/4	6 3/8	7/8	3/4-10	7
10"	16 1/2	7 1/2	7/8	3/4-10	7

**NOTE:** This information is provided to expedite servicing of FEBCO products. One tool may be fabricated for use on all required sizes by drilling all holes at appropriate dimensions in a single steel plate of maximum required length.

**CAUTION:** To avoid possible injury during use, do not fabricate tool from lesser strength material or to smaller dimensions than minimums shown.

**FIGURE 4**

SEAT RING TOOL

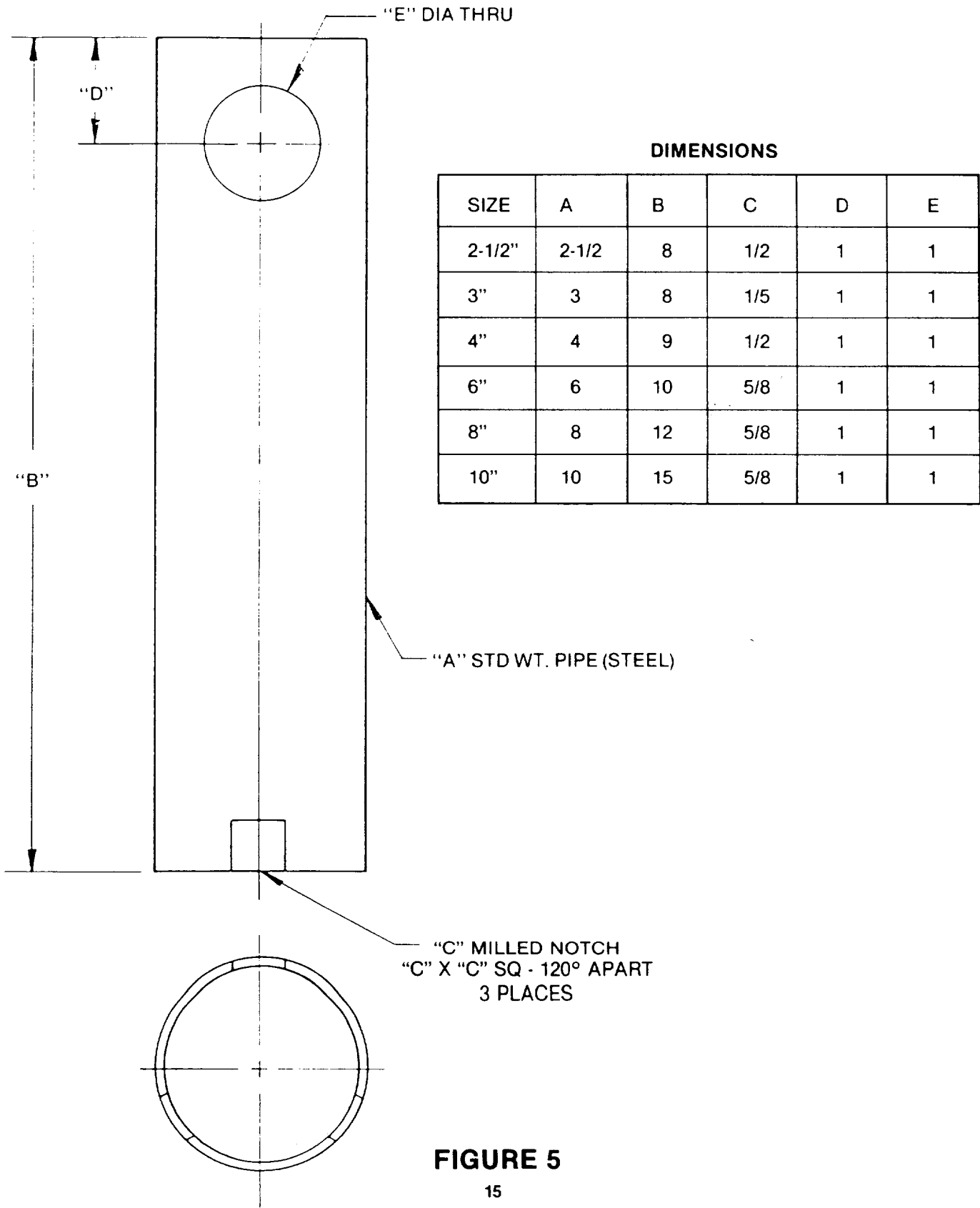


FIGURE 5

## MODEL 805Y SIZES 3/4" to 2" COMMERCIAL PARTS

ITEM	DESC.	MATERIAL	3/4"	1"	1-1/4"	1-1/2"	2"
8	O-Ring	Nitrile	568-226 2"x2-1/4"x1/8"	568-226 2"x2-1/4"x1/8"	568-226 2"x2-1/4"x1/8"	568-235 3-1/8"x3-3/8"x1/8"	568-235 3-1/8"x3-3/8"x1/8"
28	Plug	Brass	1/8" NPT	1/8" NPT	1/8" NPT	1/4" NPT	1/4" NPT
29	Gate Valve	Bronze	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT
30	Testcock	Brass	1/8" NPT	1/8" NPT	1/4" NPT	1/4" NPT	1/4" NPT

**TABLE 1**

These parts are commercially available through most hardware distributors or retailers. Gate valves, testcocks, flange gaskets, etc., are also commercially available but not listed.

## MODEL 805Y SIZES 2-1/2" to 10" COMMERCIAL PARTS

SIZE/ ITEM	7A	12	13	14	15	17	40	51
MATERIAL	BRASS	BUNA-N	ST. STL.	BUNA-N	BRASS	STEEL	BRASS	BUNA-IN
DESC.	SCREW	O-RING	CAP SCREW	O-RING	LOCK-NUT	BOLT & NUT	TESTCOCK	O-RING
2-1/2"		568-238 3-1/2x3-3/4x1/8 (2)	7/16-14x1 (16)	568-244 4-1/4x4-1/2x1/8 (2)	3/8-24 Elastic (2)	5/8-11x2-1/4 (12)	1/2 IPS 200# (4)	568-014 1/2x5/8x1/16
3"		568-246 4-1/2x4-3/4x1/8 (2)	7/16-14 x 1 (16)	568-252 5-1/4x5-1/2x1/8 (2)	3/8-24 Elastic (2)	5/8-11x2-1/2 (12)	1/2 IPS 200# (4)	568-014 1/2x5/8x1/16
4"	3/8-16x1-1/2 (2)	568-254 5-1/2x5-3/4x1/8 (2)	1/2-13x1-1/4 (16)	568-263 7-1/4x7-1/2x1/8 (2)	3/4-16 Elastic (2)	5/8-11x2-3/4 (24)	1/2 IPS 200# (4)	568-116 3/4x15/16x3/32
6"	3/8-16x2 (2)	568-264 7-1/2x7-3/4x1/8 (2)	5/8-11x1-1/2 (16)	568-272 9-1/2x9-3/4x1/8 (2)	3/4-16 Elastic (2)	3/4-10x3 (24)	3/4 IPS 200# (4)	568-116 3/4x15/16x3/32
8"	3/8-16x2 (2)	568-273 9-3/4x10x1/8 (2)	3/4-10x1-1/2 (16)	568-451 11x11-1/2x1/4 (2)	7/8-14 Elastic (2)	3/4-10x3-1/4 (24)	3/4 IPS 200# (4)	568-118 7/8x1-1/16x3/32
10"	3/8-16x2 (2)	10-5/16x10-9/16 x 1/8 (2)	3/4-10x1-3/4 (24)	12-3/4x13x1/8 (2)	7/8-14 Elastic (2)	7/8-9x3-1/2 3-1/2 (36)	3/4 IPS 200# (4)	568-118 7/8x1-1/16x3/32

**TABLE 2**

## MODEL 806DCDA - SIZES 4" to 10" COMMERCIAL PARTS

ITEM	DESC.	MATERIAL	4	6	8	10
40	Ball Valve	Bronze	1/2"	3/4"	3/4"	3/4"
41	Nipple	Bronze	1/2 x Close	3/4 x Close	3/4 x Close	3/4 x Close
62	90" Elbow	Bronze	1/2"	3/4"	3/4"	3/4"
63	Tee	Bronze	1/2"x1/2"x1/2"	3/4"x3/4"x3/4"	3/4"x3/4"x3/4"	
64	Nipple	Bronze	1/2"x5"	3/4"x6"	3/4"x6"	3/4"x6"
65	Bushing	Bronze	1/2"x3/4"	—	—	—
66	Nipple	Bronze	—	3/4"x2-1/2"	3/4"x2-1/2"	3/4"x2-1/2"

**NOTE:** All parts listed in Tables 1 and 2 are applicable to the double check valves of the 806DCDA. The water meter is a 5/8" x 3/4" size. Several brands are USC approved for use on this assembly. Contact the FEBCO plant for additional information.

These parts are commercially available through most hardware distributors or retailers. Gate valves, testcocks, flange gaskets, etc., are also commercially available but not listed.

### TABLE 3

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## WARRANTY

All products sold by CMB Industries are subject to the following warranty: CMB Industries warrants all products manufactured by it will be free from defects in workmanship and materials for a period of one (1) year from the date of original shipment, provided such product is used under normal conditions within the recognized pressure and temperature limits and is given normal service and care. **CMB INDUSTRIES MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, THE WARRANTY OF FITNESS FOR PARTICULAR PURPOSE.** This warranty is void with respect to any such product which is altered or tampered with by anyone without prior consent of the Factory. The limit of CMB Industries' liability for failure of its products to meet the foregoing warranty shall be at CMB Industries' sole option, repair or replacement of the defective product and shall exclude any damage caused by accident, misuse or abuse of the product. **IN NO EVENT SHALL CMB INDUSTRIES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** The buyer shall notify the Factory in writing of any claimed defects in materials or workmanship, and if authorized by the factory, shall return the product in the same condition as when received by the buyer, transportation pre-paid, to the Factory or to such other location as directed by the Factory. If said returned product is found by the Factory to be defective in workmanship or materials, it shall be replaced or repaired without charge, as the Factory shall determine.

The physical or chemical properties of CMB Industries' products represent typical, average values obtained in accordance with test methods and are subject to normal manufacturing variations. The information is supplied as a technical service and is subject to change without notice.

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A division of CMB Industries

**FEBCO BACKFLOW PREVENTION**

**BACKFLOW PREVENTION SUPPLY**  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

**MASTER**  
**series™**

**OPERATIONS & MAINTENANCE**  
**M A N U A L**

**Double Check**  
**and**  
**Double Check Detector**

**Backflow Prevention**  
**Assemblies**

**Models**  
**850, 856,**  
**870, 870V,**  
**876 and 876V**



performance at the lowest installed cost



---

## **Warranty**

All products (manufactured and) sold by CMB Industries are subject to the following warranty: CMB Industries warrants all products manufactured by it will be free from defects in workmanship and material for a period on one (1) year from the date of original shipment, provided such products are used under normal conditions within the recognized pressure, flow and temperature limits and are given normal service and care. CMB INDUSTRIES MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE. In the event of a defect in material or workmanship of a product covered by this warranty, CMB Industries shall, at its sole option, repair or replace such defective product. This warranty is void with respect to any such product which is altered or tampered with by anyone without prior consent of the Factory. CMB Industries shall not be liable under any circumstances for damages caused by accident, misuse or abuse of the product. IN NO EVENT SHALL CMB INDUSTRIES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. To make a claim under this warranty, the buyer must notify the Factory in writing within ten (10) days of discovery of any claimed defects or workmanship, and if authorized by the Factory, shall return the product in the same condition as when received by the buyer, transportation pre-paid, to the Factory or to such other location as directed by the Factory. If said returned product is found by the Factory to be defective in workmanship or materials, it shall be repaired or replaced without charge, pursuant to the terms of this warranty. This warranty excludes component parts or appurtenances not manufactured by CMB Industries. Any claims with respect to such equipment must be made to the manufacturer thereof in accordance with the terms of the warranty, if any, given by such manufacturer, or pursuant to such warranties as may exist by law. The physical or chemical properties of CMB Industries' products represent typical, average values obtained in accordance with test methods and are subject to normal manufacturing variations. The indicated minimum values are as shown. This information is supplied as a technical service and is subject to change without notice.

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## **How to order repair kits**

- 1) Locate item number and kit number in this maintenance manual.
  - 2) Verify the size of the valve the parts are to be used on.
  - 3) Provide full model number located on I.D. plate.
  - 4) Give kit number.
  - 5) A serial number (located on the I.D. plate) will assist in ordering the proper kits.
  - 6) Contact your local Febco Parts Distributor.
-

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<i>How To Order Repair Kits .....</i>	<i>Inside Front</i>
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<i>Freeze Protection Procedures.....</i>	<i>3</i>
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<i>General Service Procedures.....</i>	<i>8</i>
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<i>Parts List and Kit Numbers for Models 850, 856, 870 and 876 (2 1/2" - 10") .....</i>	<i>10</i>
<i>Cut-a-way View of Model 850 (figure 9) .....</i>	<i>11</i>
<i>Cut-a-way View of Model 870 (figure 10) .....</i>	<i>11</i>
<i>Service Procedures 3/4" for Bypass.....</i>	<i>12-13</i>
<i>Parts List and Kit Numbers for Model 805YB 3/4" .....</i>	<i>13</i>
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## **Features and operating procedures**

### **DOUBLE CHECK BACKFLOW PREVENTER ASSEMBLY OPERATION**

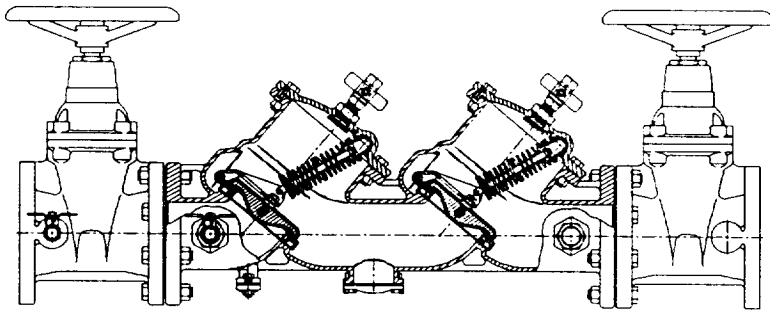
The Febco Double Check Assembly Backflow Preventer consists of two independently operating, spring loaded check valves. The pressure drop across the first check valve is approximately 1.0 PSIG with no flow. The pressure drop across the second check valve is also 1.0 PSIG with no flow.

A complete assembly includes two shut-off valves and four test cocks.

### **DOUBLE CHECK DETECTOR BYPASS OPERATION**

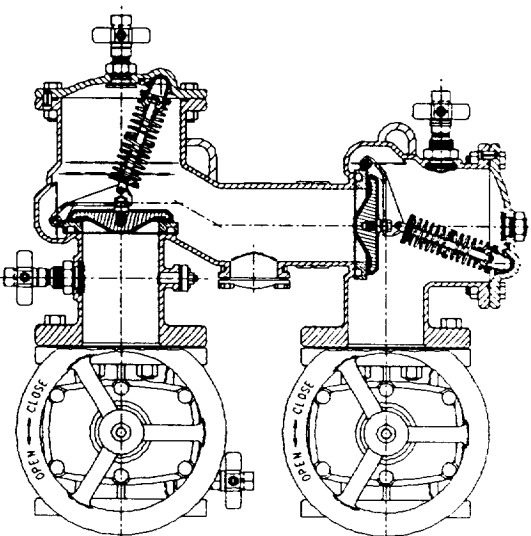
All low flow demands up to a minimum of three GPM are to pass only through the bypass assembly.

All flows above three GPM will pass through both the bypass and mainline valve without accurate meter registration.



**MODEL 850 (2 1/2"-10")**

*FIGURE NO. 1*



**MODEL 870 (2 1/2"-10")**

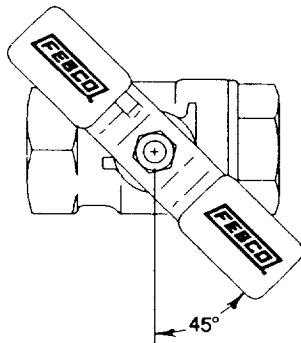
*FIGURE NO. 2*

## Freeze protection

The Double Check Backflow Prevention Assembly may be subject to damage if the internal water is allowed to freeze. The unit must be protected from freezing using a heated enclosure, insulation using heat tape, or other suitable means. The unit must always be accessible for testing and maintenance. If the system will be shut down during freezing weather, use the following procedure to drain internal passages.

### BALL VALVE SHUT-OFF DRAINING PROCEDURE

If the assembly has been installed with ball valve shut-off valves, they must also be properly drained to prevent freeze damage. After draining procedure has been completed on the backflow prevention assembly, position all ball valve shut-offs and test cocks in a half open/half closed (45 degree) position. (see Figure No.3)



#### BALL VALVE

FIGURE NO.3

Open the ball valve approximately 45 degrees while draining the pipeline and assembly to allow water between the ball valve and valve body to drain. Leave the ball valve in this position for the winter to prevent freeze damage. The ball valves must be fully closed before the system is repressurized. **OPEN AND CLOSE BALL VALVES SLOWLY TO PREVENT DAMAGE TO THE SYSTEM CAUSED BY WATER HAMMER.**

### MAIN VALVE DRAINING PROCEDURE

Slowly close supply valve within freeze protected area, open all test valves on the backflow preventer. All water within the zone between the two checks may be drained by loosening the bolts (24) on the bottom cover plate (19) (see Figure No.'s 9 and 10).

All water will be drained from the inlet side and the zone between the two checks of the model 870. All water on the inlet side will be drained down to the no. 1 test cock on the model 850. The remaining water on the inlet side may be drained to the lowest point on the model 850 by removing the small (36) bottom plate (see Figure No.'s 9 and 10). If you desire to add a drain plug there is sufficient material for drilling and tapping a 1/4" IPS thread in the cover (item 19), however, adding a drain plug is not necessary. Loosen the mounting nuts and bolt to allow drainage from beneath the plate.

The system design must provide a means for draining upstream of the #1 shut-off valve and downstream of the #2 shut-off valve.

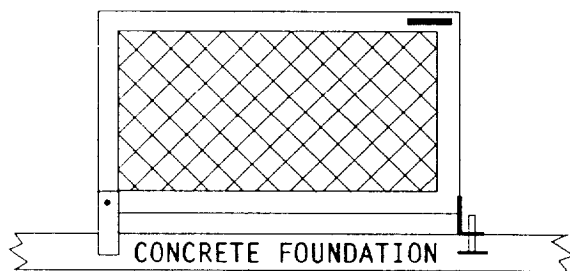
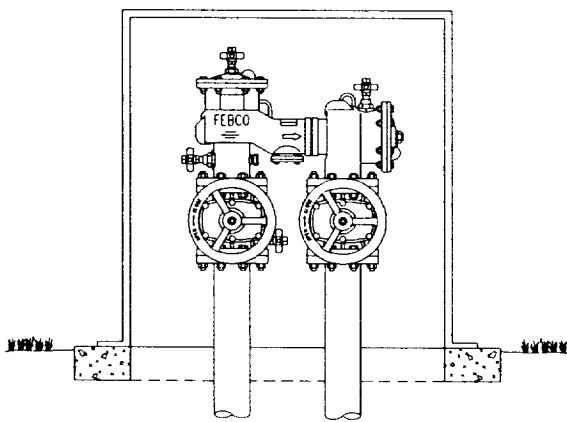
Position the assembly shut-off valves and test cocks in the half open/half closed position to allow complete draining of the assembly shut-off valve bodies and test cocks (see Figure No. 3).

## **Vandalism**

If the unit is installed where vandalism may be a problem, the assembly should be protected and secured (see Figure No. 4). On 3/4" units the handles of the shut-off valves can be removed to discourage tampering. On 2 1/2" through 10" units, a chain can be looped through both shut-off valve handwheels and locked in position to prevent tampering. Test valve handles can also be removed. On backflow prevention assemblies installed in conjunction with fire sprinkler systems, a tamper switch can be placed on the O.S. & Y. shut-off valves that will trigger an alarm if an unauthorized valve closure should occur.

A protective enclosure can be installed over the unit to discourage vandals. If an enclosure is used, it should be installed so that adequate clearance is available for maintenance and testing.

Consult local codes before installing any type of protective enclosure.



### **PROTECTIVE ENCLOSURES**

*FIGURE NO. 4*

## **Field test procedure**

Febco recommends the use of the appropriate test method as presented in the ASSE Series 5000 manual that is consistent with your local codes. If this manual is not available, you may use the following test method to confirm proper operation of the backflow preventer.

### **DOUBLE CHECK TEST PROCEDURE**

#### **TEST NO.1 CHECK VALVE**

**Requirement:** The check valve shall prevent reverse flow under all pressure differentials.

1. Using a duplex or dual gauge test kit, connect the hoses as shown (see Figure No.'s 5 and 6).
2. Open test cocks and bleed air from the test kit gauge and hoses.
3. Close the No.2 shut-off valve, then close the No.1 shut-off valve.
4. Open the bypass valve between No.1 and No.3 test cocks.
5. Slowly open the control valve (connected to test cock No.2) to reduce the pressure in the "high side gauge" to approximately 2.0 PSI lower than the "low side gauge". If this small difference can be maintained then the No.1 check valve is reported as "OK" or "TIGHT". If the difference cannot be maintained then either the check valve is leaking or the No.1 shut-off valve is leaking.

#### **TEST NO.2 CHECK VALVE**

**Requirement:** The check valve shall prevent reverse flow under all pressure differentials.

1. Connect the "low side" hose to test cock No.4, and connect the "high side" hose to test cock No.3.
2. Open the No.1 shut-off valve to repressurize the assembly, then close the No.1 shut-off valve.
3. Test the No.2 check valve using the same procedure as used for the No.1 check valve. Return assembly into service when testing has been completed.

### **DCDA TEST PROCEDURE**

This valve type is tested using the same method as the double check assemblies. The bypass double check valve must be isolated from the mainline valve by closing the shut-off valves on the bypass line (see Figure No.'s 11 and 12).

#### **BYPASS TEST**

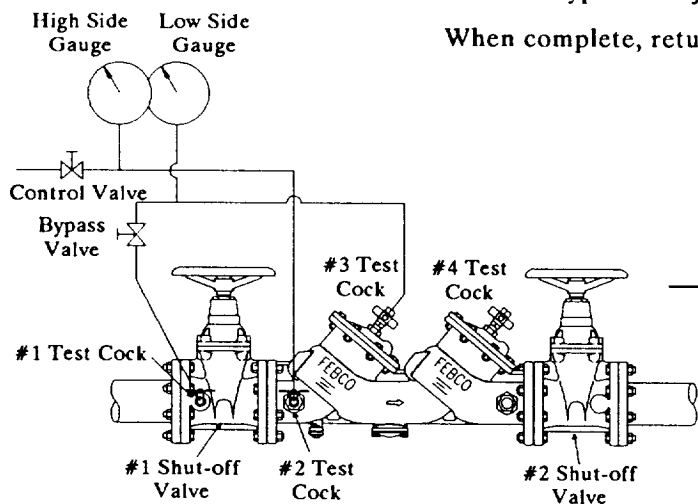
**Requirement:** All flow up to a minimum of three GPM will pass only through the bypass assembly. All flows above three GPM will pass through both the mainline valve and the bypass assembly without accurate registration by the meter.

1. Close No.2 shut-off valve on main valve assembly.

# Field test procedure (continued)

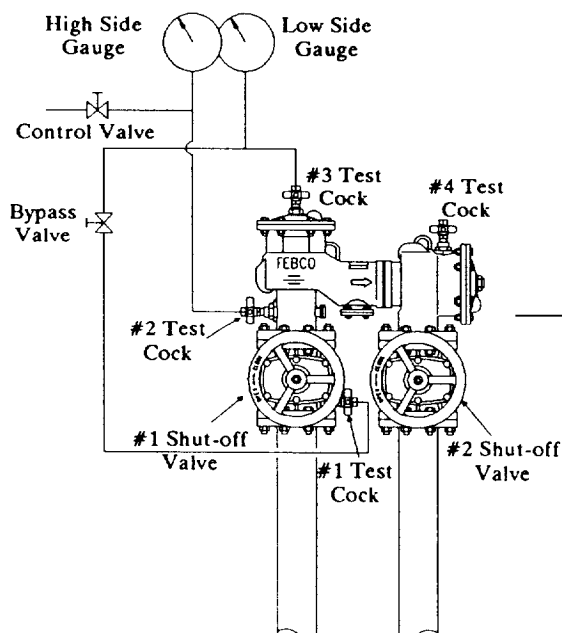
2. Locate the main valve assembly #4 test cock. If it is physically located on:
  - a) main valve, (in-line) proceed to step 7.
  - b) bypass (n-shape) proceed to step 3.
3. Close No. 2 shut off on bypass.
4. Open #4 test cock (main valve). This will create flow which will remove bypass debris (downstream).
5. Close #4 test cock.
6. Open #2 shut off on bypass.
7. Open No.4 test cock (main valve) **UNTIL** a flow of three GPM is reached, as measured on the bypass meter (one gallon flow in twenty seconds).
8. Collect the flow from No.4 test cock in a measuring container. If one gallon is collected in a twenty second time period, the bypass is reported as "OK". If the container fills to one gallon in less than twenty seconds, then the bypass is rejected. Refer to service procedures.

When complete, return the valve into service.



## MODEL 850 TEST PROCEDURE

FIGURE NO. 5



## MODEL 870 TEST PROCEDURE

FIGURE NO. 6

## **Trouble shooting procedure**

---

### **SYMPTOM NO. 1:**

**Check fails to hold 1.0 PSID minimum.**

**CAUSES:**

- A. Debris on sealing surfaces
- B. Leaking shut-off valve
- C. Damaged seat or seat disc
- D. Spring stem not moving  
freely

**SOLUTION:**

Inspect and clean  
Inspect and clean, or repair  
Disassemble and replace  
Inspect for debris or  
damage

---

### **SYMPTOM NO. 2:**

**Chatter during flow conditions.**

**CAUSES:**

- A. Worn or damaged parts

**SOLUTION:**

Inspect and replace  
worn or damaged parts

---

### **SYMPTOM NO. 3:**

**Low flows passing through the mainline valve.**

**CAUSES:**

- A. Mainline check fouled
- B. Bypass plugged

**SOLUTION:**

Inspect and clean, or repair  
Inspect and clean

---

## **General service procedures**

1. Febco backflow prevention assemblies can be serviced with standard tools and are designed for ease of maintenance. The assemblies are designed to be serviced in line, so the unit should not need to be removed from the line during servicing. **NO** special tools required.
2. The most common cause of check fouling is dirt and debris in the seating areas. The line should be flushed clean of debris before installation of the assembly. To flush the line after installation of the assembly, slowly close the inlet shut-off valve, remove the covers and spring assemblies of both check valves and open the inlet shut-off valve to allow sufficient flow of water through the assembly to clear all sand, debris, etc. from the line. If debris in the water continues to cause fouling, a strainer may be installed upstream of the assembly. (Check local codes.)
3. Rinse all parts with clean water before reassembly.
4. Lubricant is required only for #2 check cover o-ring (models 870 and 876). Use only Dow Corning III silicone valve lubricant and sealant.
5. Carefully inspect seals and seating surfaces for damage or debris. If the check valve seat disc has been severely cut at the seat ring diameter, the assembly has been subjected to extremely high and repeated back pressure. Either thermal water expansion or water hammer are the most likely causes. If back pressure persists, consider installation of a pressure relief valve downstream of the assembly.
6. Use caution to avoid damaging any guiding surfaces while handling parts. Do not force parts together. The o-ring seals used in Febco assemblies require only a small tightening force to insure a positive seal.
7. Test unit after servicing to insure proper operation (see page 5 and 6).
8. Refer to applicable parts list (see Figure No. 8) and cut-a-ways (see Figure No.'s 7, 9, and 10) for visual aid information.

## CHECK VALVE DISASSEMBLY AND REASSEMBLY

## 1. SPRING MODULE REMOVAL

- a. Slowly close outlet shut-off valve and inlet shut-off valve. Bleed residual pressure by opening #4, #3, and #2 test cocks (see Figure No.'s 5 and 6 for test cock location).
- b. Remove cover bolts, removing the two bolts last that are located next to the retainer pin. Remove cover.

**NOTE:** Spring module is positioned in the body by the cover. Spring module is captured.

- c. Refer to Figure No.'s 9 and 10. Remove pivot bearing (13) from the upper spring retainer of the spring module. Inspect pivot bearing (13) and bearing socket (15 ). Small hole in bearing socket indicates replacement is required. Remove retaining clip (5.1) from groove on one end of the load pin (7). Hold spring module with one hand while sliding out load pin (7) from arm (4). Lift out spring module and inspect for wear or damage. Replace spring module if necessary.

## 2. CHECK DISK REMOVAL

- a. Remove jam nut (16) and washer (17) from check disc stem threads. Lift the arm and remove the check disc (6). Inspect sealing surface for debris or damage. Replace check disc if necessary.**

**NOTE:** When jam nut (16) is tight, check disc is designed to "wobble."

### 3. SEAT RING ASSEMBLY REMOVAL

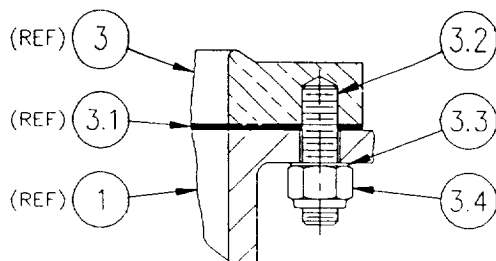
**NOTE:** Remove the seat ring assembly only if the seat ring (3) or arm (4) appear to be worn or damaged.

- a. Remove locknuts (3.4) and washers (3.3) (see Figure No. 7).**

**NOTE:** When reassembling, tighten locknuts to 12-15 ft/lbs. If leaking occurs around bolt, further tighten until leaking stops.

- b. Remove seat ring assembly.
- c. Remove retaining clip (5) from one end of the swing pin (4.2). Hold arm (4) while sliding out swing pin (4.2). Inspect bushings (4.1) and pin (4.2) for wear or damage. Replace if necessary. Inspect gasket (3.1) for debris and/or damage. Replace if necessary.

**NOTE:** Reverse the procedure above, to reassemble the components. Seat ring will only fit into body one way. Check alignment of seat ring if studs don't align with body holes. Gasket is also non-symmetric. Both seat ring and gasket have a notch that indicates non-symmetric hole. Clean all parts thoroughly with clean water before reassembly. Reassemble and bleed test cocks #4, and #3. Repressurize the assembly and test to ensure proper operation.



## SEAT RING

FIGURE NO. 7



# Model 850, 856, 870, & 876

## (2 1/2"-10)

### PARTS AND MATERIALS LIST

FIGURE NO. 8

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1	Body	A536 GR 65-45-12	14	Flange Gasket	Rubber / Fabric
2	Cover	A546 GR 65-45-12	15	Bearing Socket	Acetal Resin
2.1	O-Ring	EPDM ASTM D2000	16	Hex Jam Nut	18-8 SS
2.2	Cap Screw	Plated Steel	17	Washer	302 SS
2.3	Hex Nut	Plated Steel	18	Flange Bolt	Plated Steel
2.4	Expansion Pin	420 SS	18.1	Flange Nut	Plated Steel
3	Seat Ring	B584 Alloy C83600	19	Cover	B584 Alloy C83600
3.1	O-Ring	EPDM ASTM D2000	24	Bolt	Plated Steel
4	Arm	B584 Alloy C83600	25	Bolt	Plated Steel
4.1	Bushing-Swing Pin	Acetal Resin	26	Gasket	EPDM ASTM D2000
4.2	Swing Pin	304 SS	35	O-Ring	EPDM ASTM D2000
5	Retaining Clip	302 SS	35.1	Back-up Ring	Acetal Resin
5.1	Retaining Clip	302 SS	36	Cover	B584 Alloy C83600
6	Check Disc Assy	EPDM Coated GR, 45 Ductile Iron with 304 SS	40	Ball Valve	B584 Alloy C84400
7	Load Pin	304 SS	41	Nipple	Brass
8	Lwr Spring Retnr	B584 Alloy C83600	42	Gate Valve (NRS)	AWWA C509
9	Spring Stem	304 SS	43	Bulkhead Fitting	B584 Alloy C83600
9.1	Elastic Stop Jam Nut	18-8 SS	43.1	Bulkhead Fitting	B584 Alloy C83600
10	Spring	A313 Type 631 SS	44	Bulkhead Plug	B584 Alloy C83600
10.2	Spring Shim	Acetal Resin	45	Gasket	EPDM ASTM D2000
11	Spring Guide	B130 Alloy C22000	45.1	Gasket	EPDM ASTM D2000
12	Upr Spring Retnr	B584 Alloy C83600	46	Washer	B36 Alloy 260
12.1	Bushing-Spr. Stem	Acetal Resin	46.1	Washer	B36 Alloy 260
13	Pivot Bearing	B584 Alloy C83600	47	Nut	B584 Alloy C83600
			47.1	Nut	B584 Alloy C83600

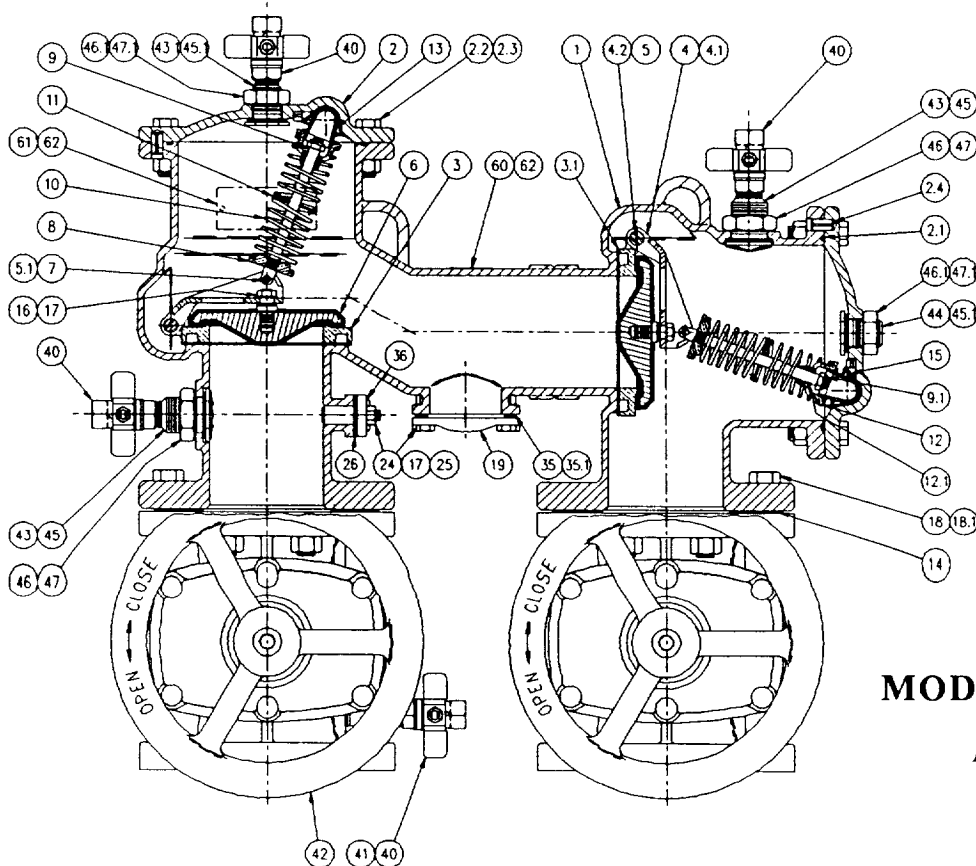
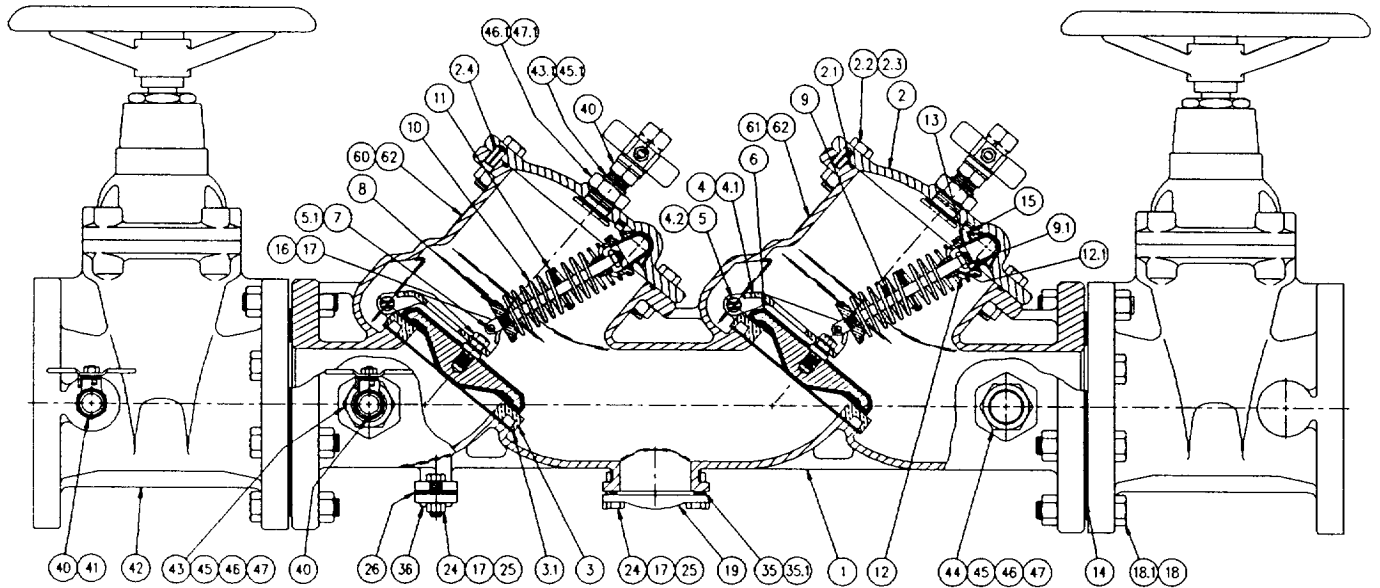
### REPAIR KITS: MODELS 850, 856, 870, and 876

DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
850/870 DC Inlet Spring Module (items 8, 9, 9.1, 10, 11, 12, 12.1)	905-142	905-142	905-143	905-144	905-145	905-146
856/876 DCDA Inlet Spring Module (items 8, 9, 9.1, 10, 10.2, 11, 12, 12.1)	905-147	905-147	905-148	905-149	905-150	905-151
850/870 DC Outlet Spring Module (items 8, 9, 9.1, 10, 11, 12, 12.1)	905-142	905-142	905-143	905-144	905-145	905-146
856/876 DCDA Outlet Spring Module (items 8, 9, 9.1, 10, 10.2, 11, 12, 12.1)	905-147	905-147	905-148	905-149	905-150	905-151
Disc Assembly (items 6, 16, 17)	905-152	905-152	905-153	905-154	905-155	905-156
Seat Ring / Arm Assembly (items 3, 3.1, 3.2, 3.3, 3.4, 4, 4.1, 4.2, 5)	905-157	905-157	905-158	905-159	905-160	905-161
Rubber Kit (items 2.1, 3.1, 6, 15, 26, 35, 35.1, 45, 45.1)	905-162	905-162	905-163	905-164	905-165	905-166
Cover Assembly (items 2, 2.1, 2.4, 15)	905-167	905-167	905-168	905-169	905-170	905-171

# Cut-a-way views

## MODEL 850 CUT-A-WAY

FIGURE NO. 9

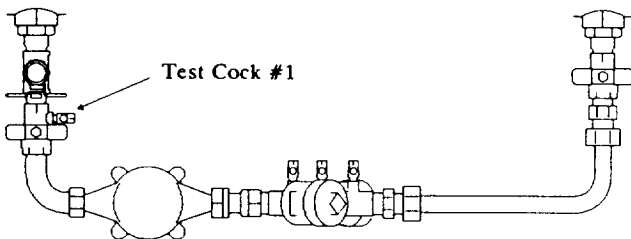


## MODEL 870 CUT-A-WAY

FIGURE NO. 10

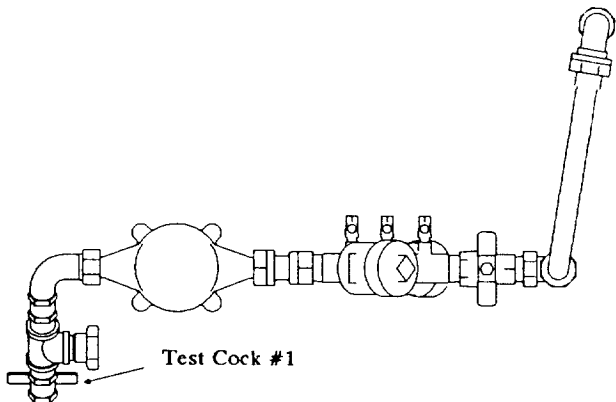
## **Service procedure 805YB 3/4" bypass**

1. Bypass Check Valve Inspection/Repair Model 805YB 3/4" (See Figure No. 13).
  - a. Close inlet and outlet shut-off valves. Bleed residual pressure by opening first the #4 test cock, then the #3 and #2 test cocks (see Figure No.'s 5 and 6 for test cock locations).
  - b. Unscrew Cap using appropriate size wrench. NOTE: Cap is spring loaded.
  - c. Remove the spring and disc holder assembly.
  - d. Inspect guiding bore of the cap and poppet stem for any build-up of calcium or other mineral deposits. If this condition exists, it may be removed with the careful use of a 5/8" (.6250) reamer or a thin blade knife.



**MODEL 856 BYPASS**

FIGURE NO. 11



**MODEL 876 BYPASS**

FIGURE NO. 12

- e. Check disc holder and stem movement in the guide to insure they move freely. Debris can inhibit proper movement.
2. Check Valve Seat Disc Replacement Model 805YB (3/4") (see Figure No. 13)
  - a. Hold disc holder assembly in one hand and remove screw and disc washer.

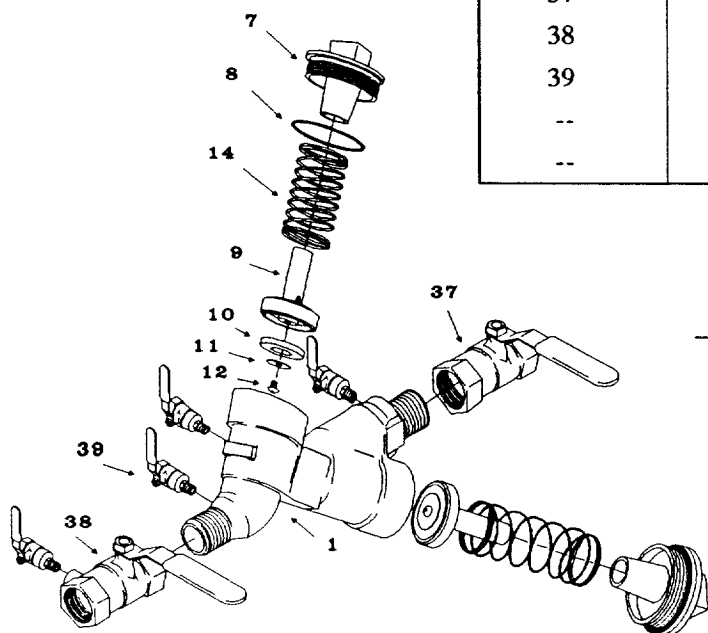
**CAUTION:** The use of pliers or other tools may damage the guiding surfaces and require unnecessary replacement. Do not scratch or mark sealing or guiding surfaces.

- b. Inspect seat disc for wear or cuts. Remove old seat disc and replace. Disc may be turned over for temporary repair until a new disc is available.

# Service procedure 805YB 3/4" bypass (continued)

- c. If the seat disc has been severely cut along the seat ring diameter, the assembly is being subjected to extremely high back pressure from thermal water expansion, water hammer or other causes of excessive water pressure. Seat discs damaged in such a manner should be replaced and not turned over to be re-used.
3. Check Valve Reassembly Model 805YB (3/4") (see Figure No. 13)
  - a. Position the disc in the cleaned holder and retain with disc washer and screw.
  - b. Position the spring around the centering ring of the disc holder and reinsert the disc holder assembly into the check body.
  - c. Apply a thin coating of FDA approved lubricant on the o-ring in the cap and thread cap onto the check valve body using the appropriate sized wrench.
  - d. Close the #4, #3, and #2 test cocks and slowly open first the inlet and then outlet shut-off valves and return the assembly to service (see Figure No.'s 5 and 6 for test cock locations).
  - e. Test the assembly to insure it is operating properly.

Item No.	Description	Qty	Part Number
1	Body	1	----
7	Cap	2	----
8	O-Ring	2	----
9	Disc Holder	2	----
10	Seat Disc	2	----
11	Washer	2	----
12	Screw	2	----
14	Spring	2	----
37	Ball Valve	1	781053
38	Ball Valve	1	781048
39	Test Cock	4	781074
--	Rubber Repair Kit	1	905042
--	Check Assembly	2	905044



**MODEL 805YB 3/4" BYPASS**

FIGURE NO. 13



Division of CMB Industries

## U.S. Sales Representative Listing

1550 N. Peach Fresno, Calif. 93727 • P.O. Box 8070 Fresno, Calif. 93747  
• Fax: (209) 453-9030

WESTERN REGION	Location	Phone	Fax
Controlled Water Sales	Fresno, CA	(209) 435-5600	(209) 435-5625
Frank Products, Inc.	Portland, OR	(503) 248-0541	(503) 248-0753
KKW, Inc.	Hayward, CA	(510) 785-0735	(510) 782-1621
Lloyd & Associates	Honolulu, HI	(808) 637-5991	(808) 637-4779
PMR Associates	Chatsworth, CA	(818) 998-0083	(818) 998-3985
Stone-Drew / Ashe & Jones, Inc.	Seattle, WA	(206) 763-2850	(206) 763-0842

CENTRAL REGION	Location	Phone	Fax
Bill Boehnlein Sales	Lakeland, MN	(612) 436-8851	(612) 436-1887
Brown-Miller, Ltd.	Hillside, IL	(708) 544-7500	(708) 544-7553
Dillon Company, Inc.	Denver, CO	(303) 399-5566	(303) 399-2114
Donahue-McGuire Sales Agency, Inc.	St. Louis, MO	(314) 664-2122	(314) 664-0767
Dworkin Company, The	Kansas City, MO	(816) 531-2505	(816) 756-0326
Mid-America Sales Group, Inc.	Grimes, IA	(515) 986-9446	(515) 986-3552
OKI Sales, Inc.	Norman, OK	(405) 360-6161	(405) 360-0092
Peak Sales, Inc.	New Berlin, WI	(414) 782-1232	(414) 782-5590
PMR Associates	Phoenix, AZ	(602) 243-6075	(602) 268-2980
Vemco Sales, Inc.	Great Falls, MT	(406) 727-5335	(406) 727-5997
Woodruff Sales, Inc.	Salt Lake City, UT	(801) 972-3023	(801) 975-9135

NORTHEAST REGION	Location	Phone	Fax
C & C Marketing, Inc.	Binghamton, NY	(800) 333-0977	(607) 773-1637
Chesapeake Marketing	Lanham, MD	(301) 577-2164	(301) 577-7189
Charles R. Morrow & Sons	Springfield, PA	(215) 328-0715	(215) 328-0759
Closter Bros., Inc.	Bohemia, NY	(516) 563-3900	(516) 563-3937
De Broka & Assoc., Inc.	Sterling Heights, MI	(313) 979-5980	(313) 979-1757
Hosking Assoc., Inc.	Milford, CT	(203) 877-5841	(203) 877-8042
Kerr Marketing Agency	Cleveland, OH	(216) 582-1720	(216) 582-1842
Shadco, Inc.	Indianapolis, IN	(317) 251-9045	(317) 251-9301
Technical Marketing	Louisville, KY	(502) 425-8051	(502) 425-8170

SOUTHEAST REGION	Location	Phone	Fax
C.A. Riner Company, Inc.	Little Rock, AR	(501) 834-1400	(501) 834-1407
Coleman-Russell & Assoc., Inc.	Birmingham, AL	(205) 833-0700	(205) 836-6528
Colonial Sales Agency	Tampa, FL	(813) 621-3470	(813) 622-7863
Colonial Sales Agency	Pompano Beach, FL	(305) 785-4005	(305) 785-4006
Crouch Sales Company	Antioch, TN	(615) 834-7556	(615) 833-6690
Grant & Associates	Harahan, LA	(504) 733-2999	(504) 733-9485
Manufacturers Agents, Inc.	Atlanta, GA	(404) 351-2074	(404) 355-3969
R. L. Brown Sales	Richmond, VA	(804) 794-6994	(804) 794-5105
SPC Marketing	Monroe, NC	(704) 283-8554	(704) 283-8010
WWIP Corp.	Houston, TX	(713) 699-5778	(713) 699-0842
WWIP Corp.	Dallas, TX	(214) 243-3633	(214) 243-3632

Note: See separate listing for sales representation outside of the United States.

Revised 10/92

**FEBCO BACKFLOW PREVENTION**

BACKFLOW PREVENTION SUPPLY

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Reduced Pressure  
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**Backflow Prevention  
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**Models  
860, 866,  
880, 886,  
880V and 886V**



**performance at the lowest installed cost**

**FEBCO®**  
**BACKFLOW PREVENTION**

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## **Warranty**

All products (manufactured and) sold by CMB Industries are subject to the following warranty: CMB Industries warrants all products manufactured by it will be free from defects in workmanship and material for a period on one (1) year from the date of original shipment, provided such products are used under normal conditions within the recognized pressure, flow and temperature limits and are given normal service and care. CMB INDUSTRIES MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE. In the event of a defect in material or workmanship of a product covered by this warranty, CMB Industries shall, at its sole option, repair or replace such defective product. This warranty is void with respect to any such product which is altered or tampered with by anyone without prior consent of the Factory. CMB Industries shall not be liable under any circumstances for damages caused by accident, misuse or abuse of the product. IN NO EVENT SHALL CMB INDUSTRIES BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. To make a claim under this warranty, the buyer must notify the Factory in writing within ten (10) days of discovery of any claimed defects or workmanship, and if authorized by the Factory, shall return the product in the same condition as when received by the buyer, transportation pre-paid, to the Factory or to such other location as directed by the Factory. If said returned product is found by the Factory to be defective in workmanship or materials, it shall be repaired or replaced without charge, pursuant to the terms of this warranty. This warranty excludes component parts or appurtenances not manufactured by CMB Industries. Any claims with respect to such equipment must be made to the manufacturer thereof in accordance with the terms of the warranty, if any, given by such manufacturer, or pursuant to such warranties as may exist by law. The physical or chemical properties of CMB Industries' products represent typical, average values obtained in accordance with test methods and are subject to normal manufacturing variations. The indicated minimum values are as shown. This information is supplied as a technical service and is subject to change without notice.

---

## **How to order repair kits**

- 1) Locate item number and kit number in this maintenance manual.
  - 2) Verify the size of the valve the parts are to be used on.
  - 3) Provide full model number located on I.D. plate.
  - 4) Give kit number.
  - 5) A serial number (located on the I.D. plate) will assist in ordering the proper kits.
  - 6) Contact your local Febco Parts Distributor.
-



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# Features and Operating Procedures

## REDUCED PRESSURE BACKFLOW PREVENTER

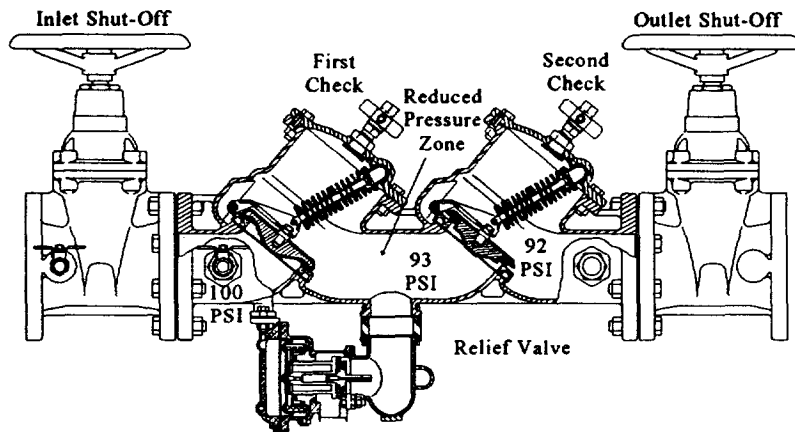
The Febco Reduced Pressure Backflow Preventer Assembly consists of two independently operating, spring loaded check valves with a pressure differential relief valve located between the two checks. The pressure drop across the first check valve is approximately 7.0 PSID with no flow. The relief valve consists of a hydraulically balanced diaphragm with the high pressure side hydraulically connected to the upstream side of the first check. The low pressure side is hydraulically connected to the reduced pressure zone, thus the relief valve remains closed during normal operation. The low pressure side of the diaphragm is spring loaded to force the relief valve open when the pressure drop across the first check (and across the diaphragm) reduces to approximately 3.0 PSID. A complete assembly includes two shut-off valves and four test cocks.

Example sectional views below show typical components and flow passages with corresponding pressure readings (no flow conditions) at the various locations within the assembly with 100 PSI line pressure.

### MODEL 866 AND 886 BYPASS OPERATION

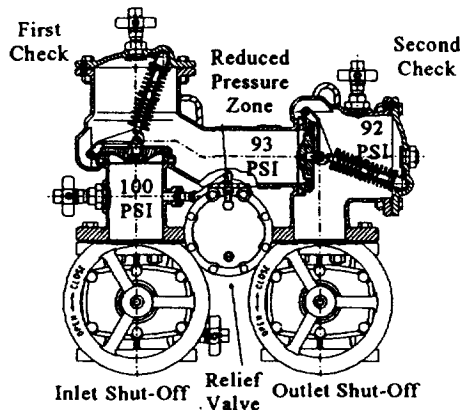
All low flow demands up to a minimum of three gpm are to pass only through the bypass meter and meter-size reduced pressure valve assembly and be accurately recorded.

All flows above that of 3 gpm will pass through both the line-size reduced pressure valve assembly and bypass without accurate registration by (or damage to) the meter.



**MODEL 860 (2 1/2" - 10")**

*Figure No. 1*



**MODEL 880 (2 1/2" - 10")**

*Figure No. 2*

# Freeze Protection Procedure

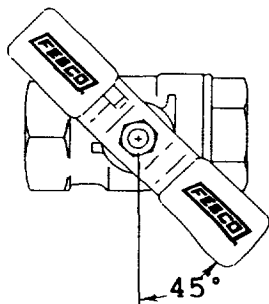
The Reduced Pressure Backflow Prevention Assembly maybe subject to damage if the internal water is allowed to freeze. It is suggested that all assemblies be installed with resilient seated shut-offs so that a drip tight closure can be achieved to prevent refilling of the assembly after the freeze protection procedure is performed. The unit must be protected from freezing using a heated enclosure, insulation using heat tape, or other suitable means. If the system will be shut down during freezing weather, use the following procedure to drain internal passages. A system should have a shut off valve located upstream of freeze protection area, and a means for draining upstream of the #1 shut off and downstream of the #2 shut-off valve.

## REDUCED PRESSURE ZONE AND RELIEF VALVE

1. Slowly close supply valve upstream of freeze protected area, open all test cocks on the backflow preventer. All water within the zone will be drained to the lowest point of the relief valve discharge port (relief valve seat). A small amount of water will remain in the bottom of the main valve body, but this is not sufficient to cause freeze damage.
2. All water on the inlet side, and within the zone, will be drained down to the no. 1 test cock on the model 880. All water will be drained from the inlet side and the zone of the model 860.
3. Remove both drain plugs from bottom of relief valve body. Replace when draining is complete.
4. Drain upstream of the #1 shut-off valve and downstream of the #2 shut-off valve.
5. Proceed to step 6 Ball Valve Shut Off Draining Procedure.

## BALL VALVE SHUT-OFF DRAINING PROCEDURE

6. If the assembly has been installed with ball valve shut-off valves, they must also be properly drained to prevent freeze damage. After the draining procedure has been completed on the backflow prevention assembly, position all ball valve shut-offs and test cocks in a half open/half closed (45 degree) position. (see Figure No. 3)



## **BALL VALVE**

*Figure No. 3*

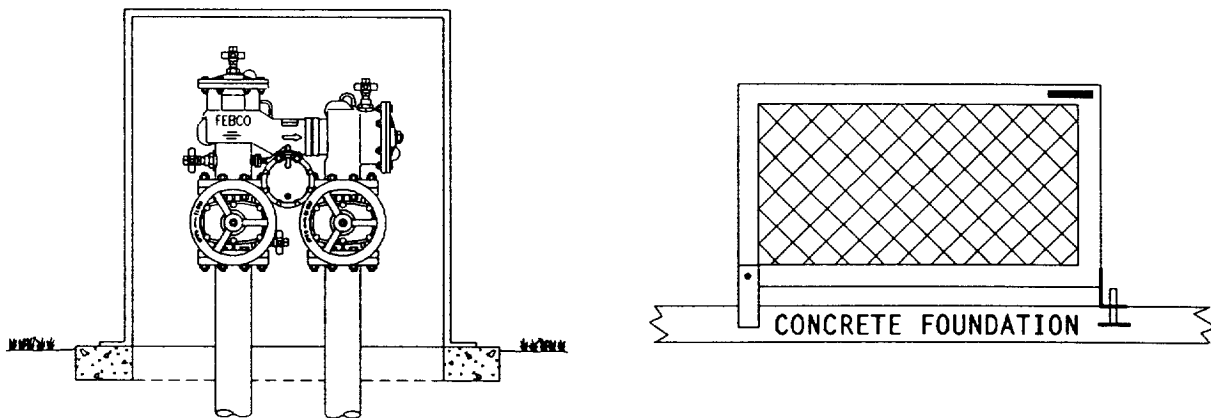
7. Open the ball valve approximately 45 degrees, while draining the pipeline and assembly, to allow water between the ball valve and valve body to drain. Leave the ball valve in this position for the winter to prevent freeze damage.
8. The ball valves must be fully closed before the system is repressurized.  
**OPEN AND CLOSE BALL VALVES SLOWLY TO PREVENT DAMAGE TO THE SYSTEM CAUSED BY WATER HAMMER.**

## Vandalism

If the unit is installed where vandalism may be a problem, the assembly should be protected and secured (see Figure No. 4). On 3/4" units the handles of shut-off valves can be removed to discourage tampering. On 2 1/2" through 10" units, a chain can be looped through both shut-off valve handwheels and locked in position to prevent tampering. Test valve handles can also be removed. On backflow prevention assemblies installed in conjunction with fire sprinkler systems, a tamper switch can be placed on the OS&Y shut-off valves that will trigger an alarm if an unauthorized closure should occur.

A protective enclosure can be installed over the unit to discourage vandals. If an enclosure is used, it should be installed so that adequate clearance is available for maintenance and testing. (See Figure No. 4.)

Consult local codes before installing any type of protective enclosure.



### PROTECTIVE ENCLOSURES

FIGURE NO. 4

# Field Testing Procedures

FEBCO recommends the use of the appropriate test method presented in the ASSE Series 5000 manual that is consistent with your local codes. If this manual is not available, you may use the following test method to confirm proper operation of this backflow preventer.

## RP TEST PROCEDURE

### TEST RELIEF VALVE OPENING POINT

Requirement: The relief valve shall open to keep the "zone" pressure at least 2 psi less than the supply pressure.

1. Using a differential pressure test kit, connect the hoses as shown (see figure No.'s 5 and 6).
2. Open test cocks and bleed air from the test kit gauge, hoses and check valve body.
3. Slowly close the #2 shut-off valve and open test cocks #2, #3 and #4.
4. Slowly open the #1 bypass needle valve until the gauge pointer starts to drop (1/4 turn maximum). Observe the reading on the gauge when the relief valve starts to discharge water. The differential pressure must be 2.0 psi or greater.
5. Close the #1 bypass needle valve.

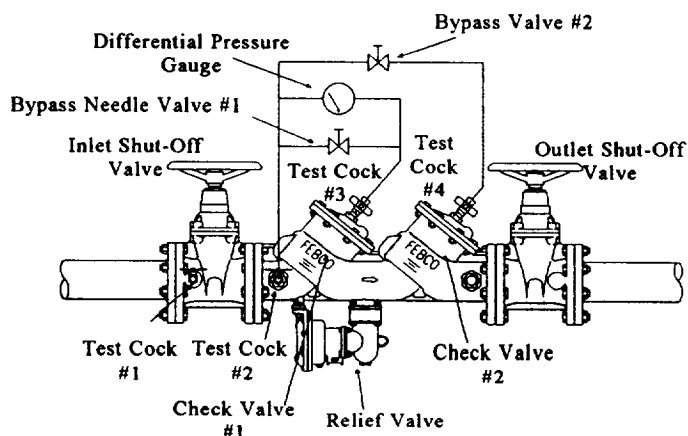
### TEST NO.1 CHECK VALVE

Requirement: The no.1 check valve must be at least 3.0 psi greater than the relief valve opening pressure.

1. Open the bleed valve on the low pressure side of the test gauge to restore the pressure in the "zone" to a normal reading, then close the bleed valve.
2. Observe the gauge reading. The pressure should be at least 3.0 psi more than the relief valve opening pressure.

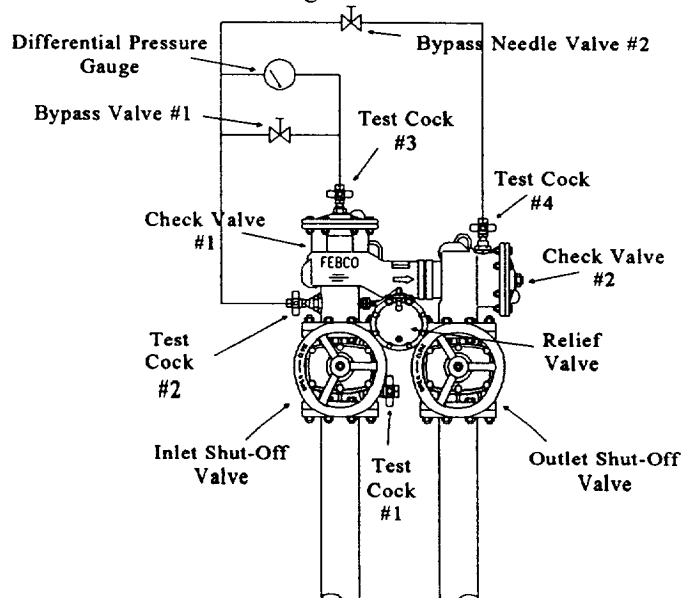
## FEBCO MODEL 860 (2 1/2" - 10")

Figure No. 5



## FEBCO MODEL 880 (2 1/2" - 10")

Figure No. 6



# Field Testing Procedures

## TEST NO. 2 CHECK VALVE

Requirement: The no. 2 check valve must be tight against reverse flow.

1. Open the #2 bypass valve.
2. The differential pressure should not drop to the relief valve opening pressure and continuously discharge water. Rubber compression of the disc will allow the differential pressure to decrease. If this occurs, open the bleed valve on the low pressure side of the test gauge to restore a normal differential. The differential should not drop to the opening point again.
3. Remove the gauge hoses and restore the valve to normal operation.

## TEST OF RELIEF VALVE FULL OPENING CAPABILITY

1. Open #4 test cock to restore the zone, then close.
2. Close #1 shut off valve.
3. Open #2 test cock to relieve pressure from high side.
4. Observe relief valve. Relief valve should open FULLY. If relief valve fails to open fully, refer to page (7), symptom (4), for trouble shooting procedure.
5. Restore the valve to normal operation.

## **RPDA TEST PROCEDURE**

This device is tested with the same procedure as the Model 860, and 880. However, when testing the mainline backflow preventer, it is necessary to close the ball valves on the bypass backflow preventer.

## BYPASS TEST

Requirement: All flow up to a minimum of three GPM will pass only through the bypass assembly. All flows above three GPM will pass through both the mainline valve and the bypass assembly without accurate registration by the meter.

1. Close No. 2 shut-off valve on main valve assembly.
2. Locate the main valve assembly #4 test cock. If it is physically located on:
  - a) main valve, (in-line) precede to step 7.
  - b) bypass (n-shape) precede to step 3.
3. Close No. 2 shut-off on bypass.
4. Open #4 test cock (main valve). This will create flow which will remove bypass debris (downstream).
5. Close #4 test cock.
6. Open #2 shut-off on bypass.
7. Open # 4 test cock (main valve) **UNTIL** a flow of three GPM is reached, as measured on the bypass meter (one gallon flow in twenty seconds).
8. Collect the flow from # 4 test cock in a measuring container. If one gallon is collected in a twenty second time period, the bypass is reported as "OK". If

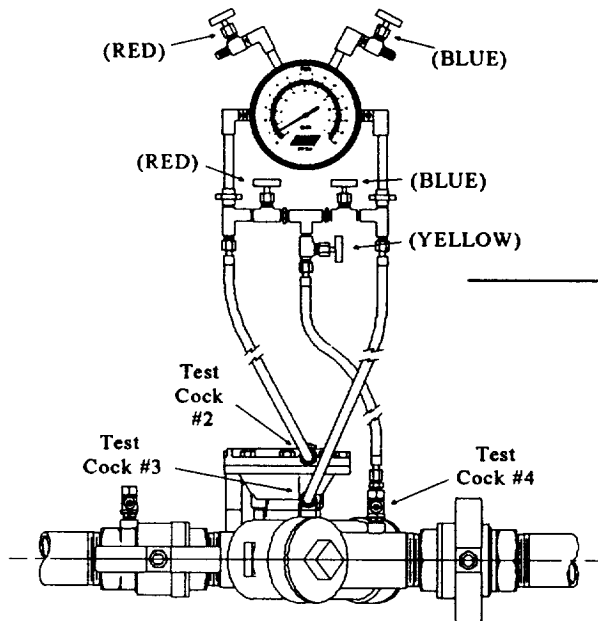
# Field Testing Procedures

the container fills to one gallon in less than twenty seconds, then the bypass is rejected. Refer to service procedures.

When complete, return the valve into service.

## TESTING WITH THE FEBCO TEST KIT

The FEBCO Test Kit includes gauge, complete with hoses, fittings, adapters and laminated instructions in a compact plastic case. The FEBCO Test Kit includes a differential pressure gauge used to test all approved Reduced Pressure Assemblies including the Febco Models 825Y, 825YB, 825YA, 825YD, 826YD, 860, 866, 880, 886, 880V and 886V.



## **FEBCO MODEL RPTK1 TEST KIT**

*Figure No. 7*

# Trouble Shooting Procedure

## WITH DIFFERENTIAL PRESSURE GAUGE

### SYMPTOM NO. 1: Check Differential Across No. 1 Check Valve

READING	PROBLEM
2 to 3 PSID	Leak in No. 1 or No. 2 check valve
6 to 8 PSID and steady	Malfunctioning pressure relief valve
2 to 7 PSID fluctuating	Inlet pressure fluctuating

### SYMPTOM NO. 2: Check Differential Across No. 1 Check Valve

READING	PROBLEM
2 to 3 PSID	No. 1 check valve held open
6 to 8 PSID and steady	Malfunctioning pressure relief valve

## WITHOUT DIFFERENTIAL PRESSURE GAUGE

### SYMPTOM NO. 1 and NO. 2: A). Close Gate Valve No. 2

RESULT	PROBLEM
If discharge stops	Leak in No. 2 check valve
If discharge does not stop	Go to "B"

### B). Open No. 4 Testcock To Produce A Flow Greater Than Differential Relief Valve Discharge

RESULT	PROBLEM
If discharge stops	Leak in No. 1 check valve
If discharge does not stop	Malfunctioning pressure relief valve

## TROUBLE SHOOTING GUIDE

<b>SYMPTOM NO. 1:</b> Continuous discharge from relief valve during NO-FLOW condition (Discharge stops with water flow).  With this symptom, the pressure drop across the No. 1 check valve would be 2 to 3 PSID. If a flow of water (more than discharge) is created through the valve, the pressure drop should increase to approximately 7 PSI.	<b>CAUSE:</b> A. Debris fouling No. 1 check valve.	<b>SOLUTION:</b> Inspect and clean.
	B. Outlet pressure higher than inlet pressure and debris fouling No. 2 check valve.	Inspect and clean.
	C. Spring stem not moving freely.	Inspect for dirt or other foreign material.
	D. Damaged seat or seat disc.	Inspect and replace. Seat disc cannot be reversed.
	E. Leakage at seal under the seat ring.	Inspect and replace seal.
<b>SYMPTOM NO. 2:</b> Intermittent discharge from relief valve during NO-FLOW condition. With this symptom, the pressure drop across the No. 1 check valve would be varying from about 2 to 7 PSID.	<b>CAUSE:</b> A. Inlet line pressure variations causing relief valve to discharge.	<b>SOLUTION:</b> Eliminate or reduce pressure variations.
	B. Pressure surges (water hammer) causing relief valve to discharge as pressure wave passes through "ZONE".	Eliminate or reduce pressure surges.

## TROUBLE SHOOTING GUIDE (CONT.)

<b>SYMPTOM NO. 3</b> Continuous discharge from relief valve during FLOW and NO-FLOW conditions.  With this symptom, the pressure drop across the No. 1 check valve would be 7 PSID or more at all times.	<b>CAUSE:</b> A. Seat disc dislodged from cavity in the mainstem (this can be caused by pressure surges during initial filling of system lines).	<b>SOLUTION:</b> Reposition disc in mainstem cavity. Re-pressurize system slowly.
	B. Debris fouling the relief valve seat.	Inspect and clean.
	C. Debris blocking the relief valve sensing passage.	Inspect and clean.
	D. Dirt or scale jamming mainstem.	Inspect and clean, or replace.
	E. Leakage at mainstem	Inspect and clean, or replace.
<b>SYMPTOM NO. 4</b> Relief valve does not open above 2.0 PSID during field testing.	<b>CAUSE:</b> A. Outlet gate valve not closed completely.	<b>SOLUTION:</b> Check for debris blocking gate.
	B. Plugged low pressure hydraulic passage (from "ZONE" to inner diaphragm).	Inspect and clean.
	C. Improper alignment of internal parts during re-assembly (causing high resistance to movement).	Disassemble and center the button, spring and mainstem.
	D. Jammed mainstem due to debris.	Clean.
<b>SYMPTOM NO. 5</b> First check pressure drop is low (less than 5 PSID) during field testing.	<b>CAUSE:</b> A. Debris fouling first check seat.	<b>SOLUTION:</b> Inspect and clean.
	B. Debris fouling second check seat with backpressure.	Inspect and clean.
	C. Inlet pressure variations causing inaccurate gauge reading.	Eliminate pressure variations.
	D. Disc does not move freely in arm. (Therefore, disc not parallel to seat ring.)	Inspect and clean if required.
	E. Damaged seat or seat disc.	Inspect and replace as required.
	F. Worn guide, bushings or stem.	Inspect and replace as required.
	G. Bearing not properly seated in cover.	Inspect and re-assemble.
<b>SYMPTOM NO. 6</b> Second check fails to hold back pressure during field testing.	<b>CAUSE:</b> A. Outlet gate valve not closed completely.	<b>SOLUTION:</b> Check for debris blocking gate.
	B. Debris fouling second check seat.	Inspect and clean.
	C. Disc not moving freely in arm.	Inspect for dirt or other foreign material.
	E. Damaged seat or seat disc.	Inspect and replace as required.
	F. Worn guide, bushings or stem.	Inspect and replace as required.
	G. Bearing not properly seated in cover.	Inspect and re-assemble.
	<b>NOTE:</b> If check valve seat disc has been severely cut at the seat ring diameter, the assembly is being subjected to extremely high and repeated back pressure. Either thermal water expansion or water hammer are the most likely causes.	



## **General Service Procedures**

### **GENERAL SERVICE INSTRUCTIONS APPLICABLE TO ALL MODELS AND SIZES.**

1. Febco backflow prevention assemblies can be serviced with commonly available tools and are designed for ease of maintenance. The assemblies are designed to be serviced in line, so the unit should not need to be removed from the line during servicing. **NO** special tools required.
2. The most common cause of check fouling and relief valve discharge is dirt and debris in the seating areas. The line should be flushed clean of debris before installation of the assembly. To flush the line after installation of the assembly, slowly close the inlet shut-off valve, remove the covers and spring assemblies of both check valves and open the inlet shut-off valve to allow sufficient flow of water through the assembly to clear all sand, debris, etc. from the line. If debris in the water continues to cause fouling, a strainer may be installed upstream of the assembly. (Check local codes.)
3. Rinse all parts with clean water before reassembly.
4. Carefully inspect diaphragms, seals and seating surfaces for damage or debris. If the check valve seat disc has been severely cut at the seat ring diameter, the assembly has been subjected to extremely high and repeated back pressure. Either thermal water expansion or water hammer are the most likely causes. If back pressure persists, consider installation of a pressure relief valve downstream of the assembly.
5. Use caution to avoid damaging any guiding surfaces while handling parts. Do not force parts together. The o-ring seals used in Febco assemblies require only a small tightening force to insure a positive seal.
6. Test unit after servicing to insure proper operation. (See Figure No.'s 5 and 6.)
7. Refer to applicable parts list (See Figure No. 9) and cut-a-ways (See Figure No.'s 10, 11, 12, 13, and 14) for visual aid information.

# Service Procedures for Models 860, 866, 880, 886 and 880V (2 1/2" - 10")

## CHECK VALVE DISASSEMBLY

### SPRING MODULE REMOVAL

1. Slowly close outlet shut-off valve and inlet shut-off valve. Bleed residual pressure by opening #4, #3, and #2 test cocks. See Figure No.'s 5 and 6 for test cock location.
  2. Remove cover bolts, removing the two bolts last that are located next to the retainer pin. Remove cover.
- NOTE:** Spring module is positioned in the body by the cover. Spring module is captured.
3. (See Figure No.'s 10 - 14.) Remove pivot bearing (13) from the upper spring retainer of the spring module. Inspect pivot bearing (13) and bearing socket (15). Small hole in bearing socket indicates replacement is required. Remove retaining clip (5.1) from groove on one end of the load pin (7). Hold spring module with one hand while sliding out load pin (7) from arm (4). Lift out spring module and inspect for wear or damage. Replace spring module if necessary.

### CHECK DISK REMOVAL

1. Remove jam nut (16) and washer (17) from check disc stem threads. Lift the arm and remove the check disc (6). Inspect sealing surface for debris or damage. Replace check disc if necessary.

**NOTE:** When jam nut (16) is tight, check disc is designed to "wobble."

### SEAT RING ASSEMBLY REMOVAL

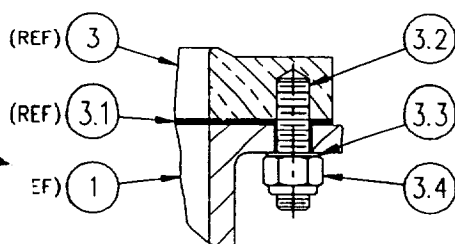
**NOTE:** Remove the seat ring assembly only if the seat ring (3) or arm (4) appear to be worn or damaged.

1. Remove locknuts (3.4) and washers (3.3). (See Figure No. 8 below.)
2. Remove seat ring assembly.

**NOTE:** When reassembling, tighten locknuts to 12 - 15 ft/lbs. If leaking occurs around bolt, further tighten until leaking stops.

3. Remove retaining clip (5) from one end of the swing pin (4.2). Hold arm (4) while sliding out swing pin (4.2). Inspect bushings (4.1) and pin (4.2) for wear or damage. Replace if necessary. Inspect gasket (3.1) for debris and/or damage. Replace if necessary.

**NOTE:** Reverse the procedure above, to reassemble the components. Seat ring will only fit into body one way. Check alignment of seat ring if studs don't align with body holes. Gasket is also non-symmetric. Both seat ring and gasket have a notch that indicates non-symmetric hold. Clean all parts thoroughly with clean water before reassembly. Reassemble and bleed test cocks #4, and #3. Repressurize the assembly and test to ensure proper operation.



## SEAT RING

Figure No. 8

**Service  
Procedures  
for Models  
860, 866,  
880, 886  
and 880V  
(2 1/2" - 10")**

**RELIEF VALVE DISASSEMBLY**

RELIEF VALVE REMOVAL (See Figure No.'s 9 - 14.)

1. Remove capscrews (24), washers (24.1) and nuts (25) at base of relief valve body and hydraulic sensing port. Remove relief valve seat ring (34) from bottom of relief valve. Inspect seat ring (34), seat disc (32), and guide (33) for debris, wear, or damage. Replace as necessary. (See below.)

RELIEF VALVE SEAT DISC REPLACEMENT

1. Separate relief valve from elbow and sensing line flange. Remove cover bolts (22) and cover (20).
2. Lift out diaphragm (37) and inspect for damage. Replace if necessary.
3. Grasp spring button (28) and pull out relief valve module.
4. Turn over relief valve assembly module so that guide (33) stem is facing up. Use tabs on guide (33) to loosen guide. Unscrew guide and replace seat disc (32).

REASSEMBLE IN REVERSE ORDER.

RELIEF VALVE DISASSEMBLY

1. Remove o-ring (34.1) and rv seat ring (34) from the bottom of rv body.
2. Remove rv cover (20) from rv body by removing eight capscrews (22).
3. Remove diaphragm from rv body. Remove rv assembly module from rv body (21).
4. Loosen tabs on guide (33) and remove guide and seat disc (32), remove instruction label (28.2) from center of button, covering flow screw (28.1).
5. Loosen flow screw (28.1) **CAUTION** spring is captured. Remove spring (29) from main guide (31), remove flow washer (30) from top of diaphragm (37).
6. Remove stem (30) and stem washer (30.1), on end of stem, from diaphragm guide assembly.
7. Unscrew retainer from main guide (31) and remove slip ring (38.1) from retainer.
8. Remove small diaphragm (37) from main guide (31).

RELIEF VALVE ASSEMBLY

**NOTE:** Clean all parts thoroughly with clean water before reassembly.

1. Place small diaphragm (37) into main guide (31) with beaded side of flange pointed down.
2. Drop slip ring (38.1) into retainer (38) and screw retainer into main guide (31) as shown, being careful not to bind the diaphragm's cup shape with your finger.
3. Place stem washer (30.1) on end of stem (30) and insert stem into diaphragm guide assembly. When the stem is fully inserted it does not bottom out against diaphragm, so do the following: Press diaphragm against stem with your

# **Service Procedures for Models 860, 866, 880, 886 and 880V (2 1/2" - 10")**

thumb and forefinger and slowly pull the stem back out with the diaphragm. Place stem guide assembly on bench with diaphragm pointed up.

4. Place flow washer (39) on top of diaphragm (37) with slots facing up and with holes lining up. Set spring (29) on main guide (31) and compress spring with button (28). With spring fully compressed insert and tighten down flow screw (28.1), being careful not to twist button or assembly which will distort the diaphragm.
5. Stick instruction label (28.2) in center of button, covering flow screw (28.1). Install seat disc (32) into stem (30) and install guide (33) to retain disc. Using tabs on guide, tighten until shoulder on guide contacts stem.
6. Lubricate o-ring (31.1) with Dow Corning 111 Valve Lubricant & Sealant, or a design engineering approved equivalent, and install on main guide (31).
7. Install assembly into rv body (21). Place large diaphragm (27), with cap facing down, into rv body and fold over stem assembly button. Pull diaphragm flange up onto rv body flange.
8. Assemble rv cover (20) to rv body using eight capscrews (22) and tighten to 120 inch-pound torque wrench limit.
9. Insert rv seat ring (34) into bottom of rv body (aligning it with guide 33) and install o-ring (34.1).

**N-SHAPE ONLY** - Assemble complete relief valve assembly to valve body as shown with o-ring (35) and back-up ring (35.1), using four capscrews (24), eight washers (24.1) and four nuts (25). Tighten to 120 inch-pounds torque wrench limit. Attach sensing line flange cover (36).

**IN-LINE ONLY** - Assemble completed unit to valve body and elbow with gasket (26) install with screen facing valve body) using six capscrews (24), twelve washers (24.1) and six nuts (25). Tighten to 120 inch-pounds torque wrench limit.

# Models 860, 866, 880, and 886

## PARTS AND MATERIALS LIST

Figure No. 9

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1	Body	A536 GR 65-45-12	21	R.V. Body	B584 Alloy C83600
2	Cover	A536 GR 65-45-12	22	Cover Bolt	18-8 SS
2.1	O-Ring	FDA EPDM	23	Elbow	A536 GR 65-45-12
2.2	Cap Screw	Plated Steel	24	RV Mtg Bolt	Plated Steel
2.3	Hex Nut	Plated Steel	25	RV Mtg Bolt	Plated Steel
2.4	Expansion Pin	420 SS	26	Gasket / Strainer	EPDM / SS Mesh
3	Seat Ring	B584 Alloy C83600	27	Lrg. Diaphragm	EPDM ASTM D2000
3.1	Gasket	EPDM ASTM D2000	28	Button	A240 304 SS
3.2	Socket Head Screw	18-8 SS	28.1	Flow Washer	Acetal Resin
3.3	Washer	304 SS	29	RV Spring	A313 Type 302 SS
3.4	Elastic Stop Nut	18-8 SS	30	RV Stem	Acetal Resin
4	Arm	B584 Alloy C83600	30.1	Stem Washer	Acetal Resin
4.1	Bushing-Swing Pin	Acetal Resin	31	Main Guide	B584 Alloy C83600
4.2	Swing Pin	304 SS	31.1	Main Guide O-Ring	FDA EPDM
5	Retaining Clip	302 SS	32	Seat Disc	EPDM ASTM D2000
5.1	Retaining Clip	302 SS	33	Lower Guide	Acetal Resin
6	Check Disc 1st Check	EPDM Coated GR, 45 Ductile Iron with A276 type 304 SS stem	34	Seat Ring	B584 Alloy C83600
6.1	Check Disc 2nd Check	EPDM Coated GR, 45 Ductile Iron with A276 type 304 SS stem	34.1	O-Ring	Nitrile ASTM D2000
7	Load Pin	304 SS	35	Back-up Ring	Acetal Resin
8	Lwr Spring Retnr	B584 Alloy C83600	35.1	O-Ring	EPDM ASTM D2000
9	Spring Stem	304 SS	36	Adaptor Plate	B584 Alloy C83600
9.1	Elastic Stop Jam Nut	18-8 SS	37	Sm. Diaphragm	EPDM ASTM D2000
10	Spring	A313 type 631 SS	38	Retainer	B584 Alloy C83600
10.1	Spring 2nd Check	A313 type 631 SS	38.1	Slip Ring	Acetal Resin
11	Spring Guide	B130 Alloy C22000	39	Flow Washer	Acetal Resin
12	Upr Spring Retnr	B584 Alloy C83600	40	Ball Valve	B584 Alloy C84400
12.1	Bushing-Spr. Stem	Acetal Resin	41	Nipple	Brass
13	Pivot Bearing	B584 Alloy C83600	42	Gate Valve (NRS)	AWWA C509
14	Flange Gasket	Rubber / Fabric	43	Bulkhead Fitting	B584 Alloy C83600
15	Bearing Socket	Acetal Resin	43.1	Bulkhead Fitting	B584 Alloy C83600
16	Hex Jam Nut	18-8 SS	44	Bulkhead Plug	B584 Alloy C83600
17	Washer	302 SS	45	Gasket	EPDM ASTM D2000
18	Flange Bolt	Plated Steel	45.1	Gasket	EPDM ASTM D2000
18.1	Flange Nut	Plated Steel	46	Washer	B36 Alloy 260
20	R.V. Cover	B584 Alloy C83600	46.1	Washer	B36 Alloy 260
20.1	Bleed Screw	18-8 SS	47	Nut	B584 Alloy C83600
20.2	Gasket	HDPE	47.1	Nut	B584 Alloy C83600
			50	Sensing Line	SAE Hydraulic Hose
			51	Street Elbow	Brass
			60	Identification Plate	B36 Alloy C26000
			61	Identification Plate	B36 Alloy C26000
			62	Drive Screw	Stainless Steel

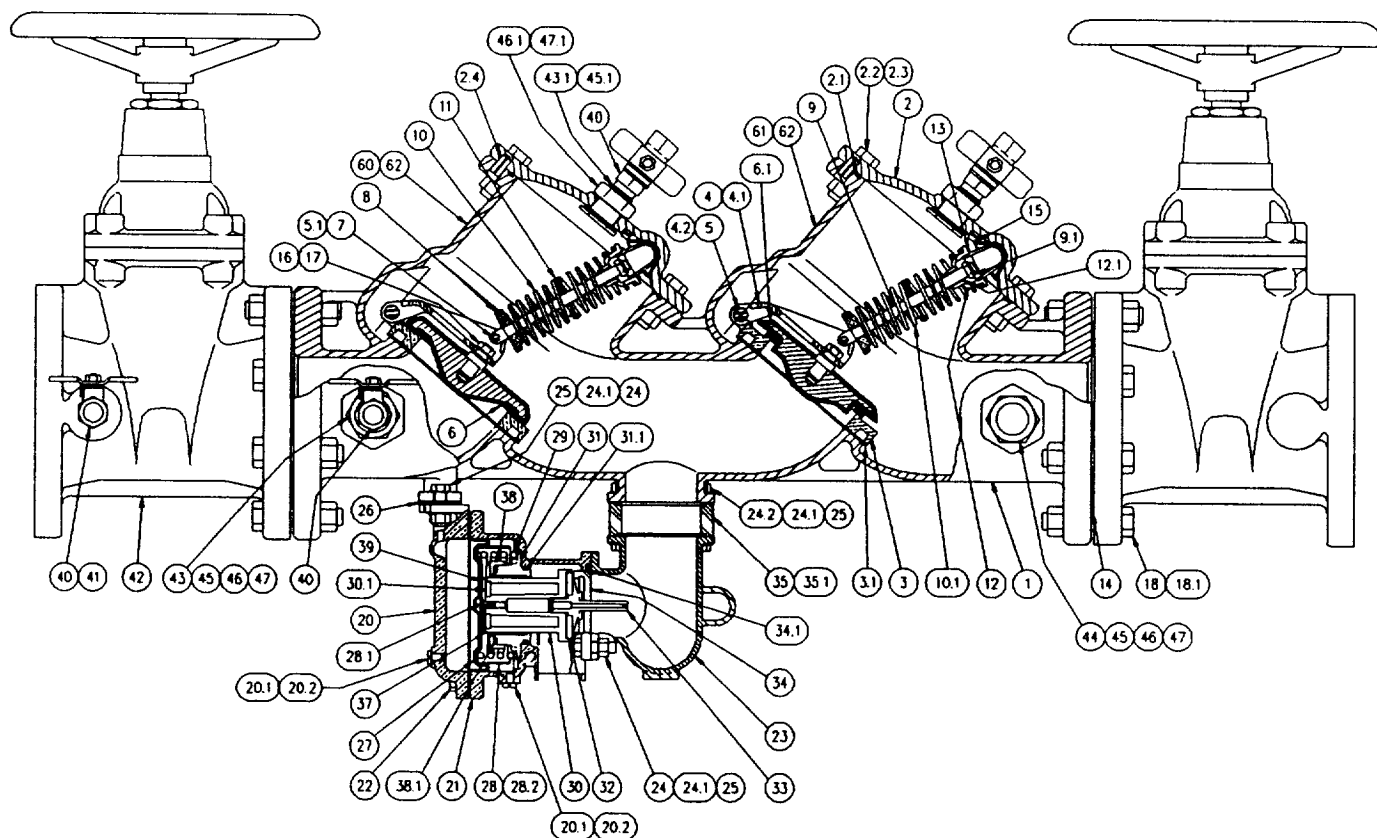
## REPAIR KITS: MODELS 860, 886, 880, AND 886

LINE #	DESCRIPTION	SIZE 2 1/2"	SIZE 3"	SIZE 4"	SIZE 6"	SIZE 8"	SIZE 10"
1	860/880 RP Inlet Spring Module (items 8, 9, 9.1, 10, 11, 12, 12.1)	905-172	905-172	905-173	905-174	905-175	905-176
2	866/886 RPDA Inlet Spring Module (items 8, 9, 9.1, 10, 11, 12, 12.1)	905-177	905-177	905-178	905-179	905-180	905-181
3	860/880 RP Outlet Spring Module (items 8, 9, 9.1, 10.1, 11, 12, 12.1)	905-142	905-142	905-143	905-144	905-145	905-146
4	866/886 RPDA Outlet Sprg. Module (items 8, 9, 9.1, 10.1, 11, 12, 12.1)	905-147	905-147	905-148	905-149	905-150	905-151
5	Inlet Disc Assembly (items 6, 16, 17)	905-152	905-152	905-153	905-154	905-155	905-156
6	Outlet Disc Assembly (items 6.1, 16, 17)	905-182	905-182	905-183	905-184	905-185	905-186
7	Seat Ring / Arm Assembly (items 3, 3.1, 3.2, 3.3, 3.4, 4, 4.1, 4.2, 5)	905-157	905-157	905-158	905-159	905-160	905-161
8	Rubber Kit (items 2.1, 3.1, 6, 6.1, 15, 26, 27, 31.1, 31.2, 32, 34.1, 35, 35.1, 45, 45.1)	905-187	905-187	905-188	905-189	905-190	905-191
9	Relief Valve Kit (items 26, 27, 28, 29, 30, 31.1, 31.2, 32, 33, 34, 34.1)	905-192	905-192	905-192	905-192	905-192	905-192
10	Cover Assembly (items 2, 2.1, 2.4, 15)	905-167	905-167	905-168	905-169	905-170	905-171

# Cut-a-way Views

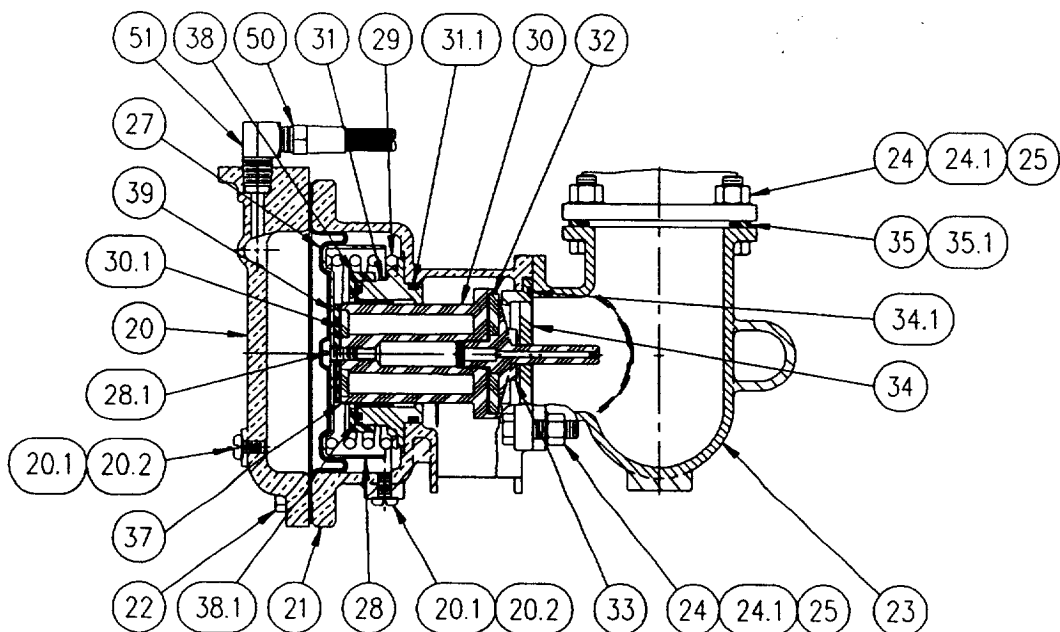
## MODEL 860 CUT-A-WAY

Figure No. 10



## RELIEF VALVE CUT-A-WAY

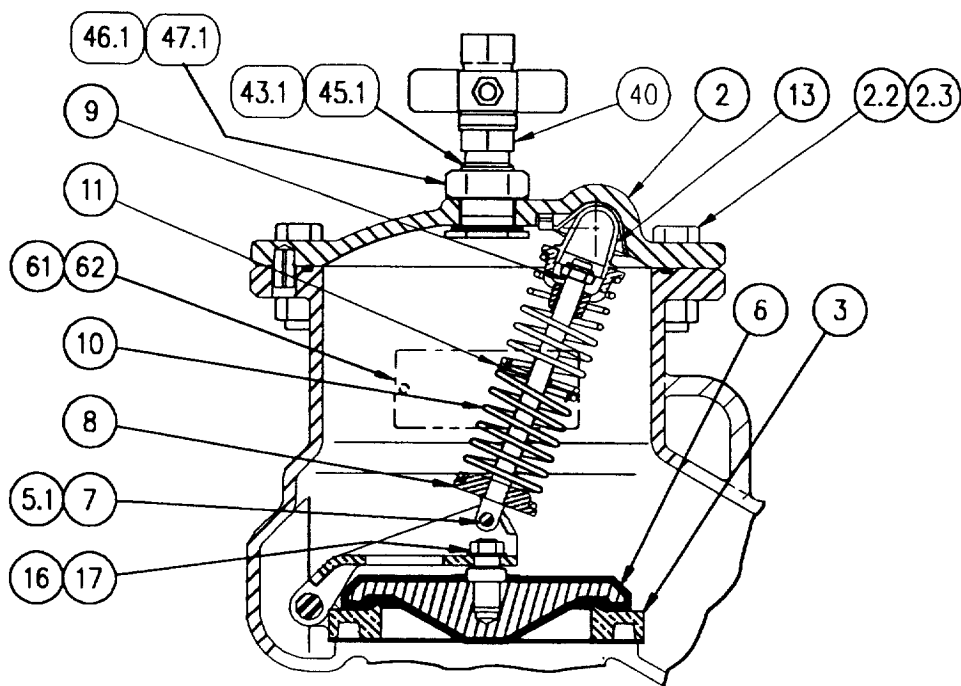
Figure No. 11



# Cut-a-way Views

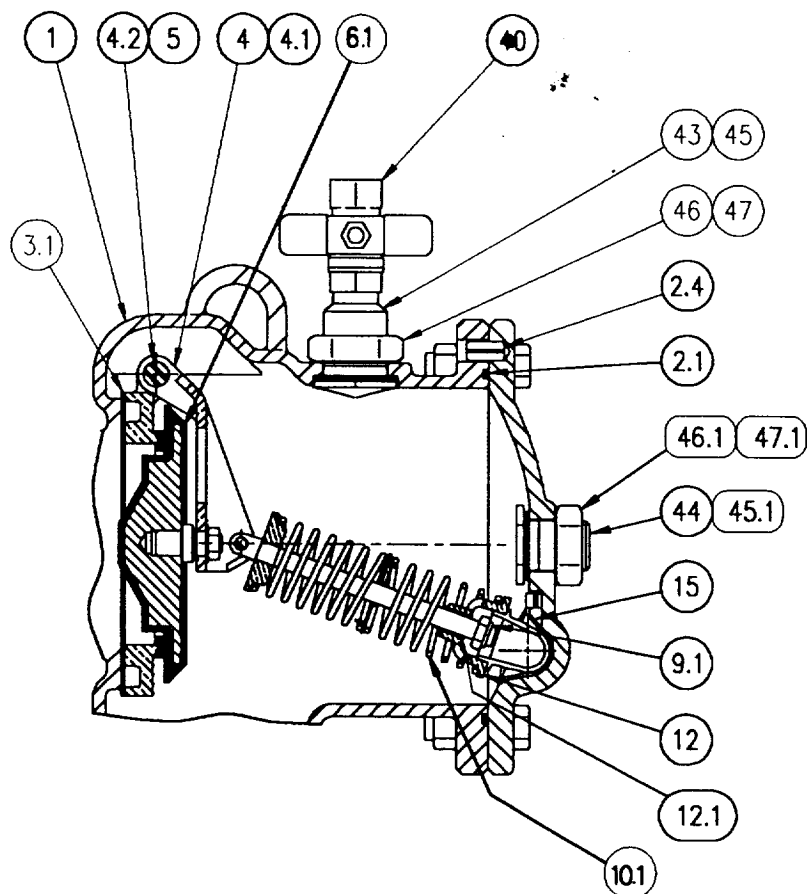
## 1st CHECK CUT-A-WAY

Figure No. 12



## 2nd CHECK CUT-A-WAY

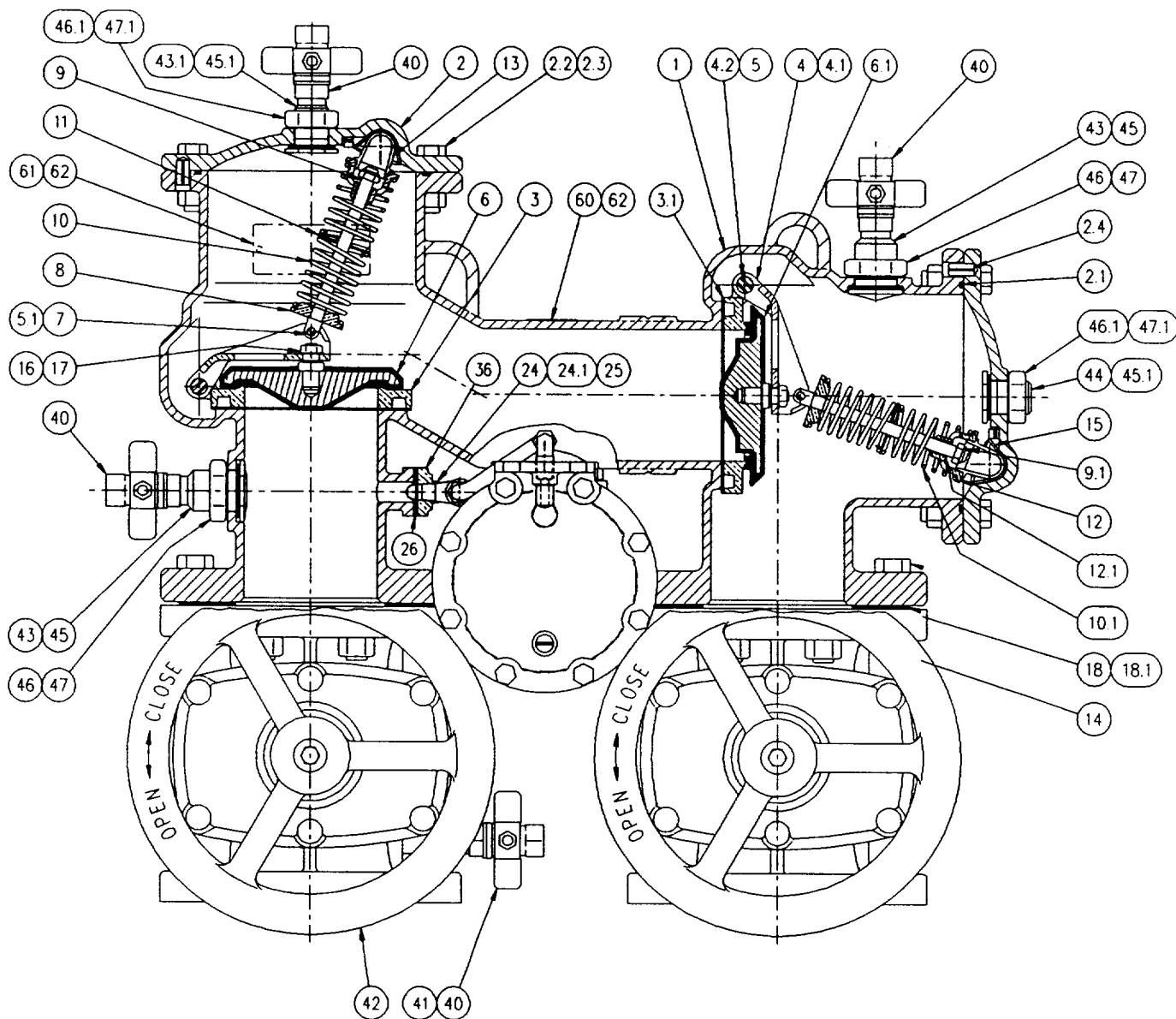
Figure No. 13



# Cut-a-way Views

## MODEL 880 CUT-A-WAY

Figure No. 14

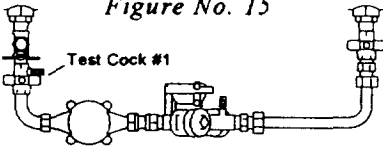




# Service Procedures for Model 825YB Bypass 3/4"

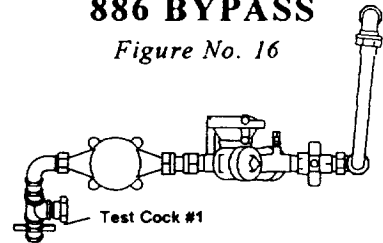
## 866 BYPASS

Figure No. 15



## 886 BYPASS

Figure No. 16



### BYPASS CHECK VALVE INSPECTION/REPAIR MODEL 825YB 3/4"

(See Figure No. 17.)

1. Close inlet and outlet shut-off valves. Bleed residual pressure by opening first the #4 test cock, then the #3 and #2 test cocks. See Figure No. 5 and 6 for test cock locations.

2. Unscrew Cap using appropriate size wrench.

**CAUTION:** Cap is spring loaded. First check spring force on 3/4" is 10 lb. Retain cap with appropriate amount of hand force to avoid injury. Second check spring force is approximately 1/4 of the first check spring.

3. Remove the spring and disc holder assembly.
4. Inspect guiding bore of the cap and poppet stem for any build-up of calcium or other mineral deposits. If this condition exists, it may be removed with the careful use of a 5/8" (.6250) reamer or a thin blade knife.
5. Check disc holder and stem movement in the guide to insure they move freely. Debris can inhibit proper movement.

### CHECK VALVE SEAT REPLACEMENT MODEL 825YB (3/4")

(See Figure No. 17.)

1. Hold disc holder assembly in one hand and remove screw and disc washer.

**CAUTION:** The use of pliers or other tools may damage the guiding surfaces and require unnecessary replacement. Do not scratch or mark sealing or guiding surfaces.

2. Inspect seat disc for wear or cuts. Remove old seat disc and replace. Disc may be turned over for temporary repair until a new disc is available.
3. If the seat disc has been severely cut along the seat ring diameter, the assembly is being subjected to extremely high back pressure from thermal water expansion, water hammer or other causes of excessive water pressure. Seat discs damaged in such a manner should be replaced and not turned over to be re-used.

### CHECK VALVE REASSEMBLY MODEL 825YB (3/4")

(See Figure No. 17.)

1. Position the disc in the cleaned holder and retain with disc washer and screw.
2. Position the spring around the centering ring of the disc holder and reinsert the disc holder assembly into the check body.

**NOTE:** Insure the heavy check spring is installed in the No. 1 check valve or the valve will not operate properly and a continuous discharge may occur.

3. Apply a thin coating of FDA approved lubricant on the o-ring in the cap and thread cap onto the check valve body using the appropriate sized wrench.
4. Close the #4, #3, and #2 test cocks and slowly open first the inlet and then outlet shut-off valves and return the assembly to service. See Figure No.'s 5

# **Service Procedures for Model 825YB Bypass 3/4"**

and 6 for testcock locations.

5. Test the assembly to insure it is operating properly.

## **RELIEF VALVE INSPECTION/REPAIR MODEL 825YB (3/4")**

(See Figure No. 17.)

1. Slowly close the inlet and outlet shut-off valves and bleed off the residual pressure by opening first test cocks #4, then #3 and #2. See Figure No.'s 5 and 6 for testcock locations.
2. Remove capscrews, diaphragm cover, diaphragm and port bushing of relief valve.
3. Remove the integral relief valve assembly by pulling it straight out of the body to remove the internal assembly.
4. Remove disc washer and seat disc by unthreading screw.
5. To remove spring and/or mainstem from the guide, keep unit compressed and remove the screw (item 18) located in the center of the button. Push the mainstem through the guide and remove the o-ring from the mainstem. Inspect and clean or replace o-ring and seat disc as required. Clean all parts thoroughly with clean water before re-assembly.

## **RELIEF VALVE SEAT REMOVAL MODEL 825YB (3/4"-2")**

Standard only on units manufactured after October of 1988 with serial numbers higher than listed below. See Figure No. 17 for exploded view of this relief valve.

Serial Numbers of New Model 825YB with replaceable relief valve seat ring:

<b>Size</b>	<b>Serial Number</b>
3/4"	Serial No. S6528 and above
1"	Serial No. S6163 and above
1 1/2"	Serial No. S5710 and above
2"	Serial No. S5089 and above

1. While relief valve is disassembled, remove the two allen head socket capscrews using the appropriate sized allen head wrench. ( 3/16" allen head wrench for 3/4" and 1" assemblies, and 1/4" allen head wrench for 1 1/2" and 2" assemblies.)
2. Pull the relief valve body from the main valve body. Pull the discharge shield from the seat ring.
3. Remove seat ring with the appropriate sized socket or needle nose pliers. Use care to avoid damage to the seat edge.
4. Inspect seat ring, o-rings, bushings, and gasket seals for damage. Rinse all parts with clean water before reassembly.

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# **Service Procedures for Model 825YB Bypass 3/4"**

## **RELIEF VALVE RE-ASSEMBLY MODEL 825YB (3/4")**

(See Figure No. 17.)

1. Lubricate the seat ring o-ring with FDA approved lubricant and thread seat ring into the valve body until seated. Do not over tighten.
2. Position the discharge shield over the seat ring diameter and, taking care not to damage the two flow passages, reinstall o-rings and guide bushings.
3. Carefully place the relief valve body over the bushing and tighten the two capscrews to retain the relief valve body to the main valve body. New capscrew sealing washers should be installed to avoid leakage.
4. Lubricate the o-rings and mainstem using FDA approved lubricant. Place the mainstem and spring into the guide and replace the flat-head screw located at the center button.
5. Place the disc washer and seat disc in position and retain with machine screw. Depress the diaphragm button to insure it is free moving.
6. Place the relief valve module into the relief valve body and mount the diaphragm. Be careful to position the diaphragm over the port bushing. Replace the relief valve cover and tighten the capscrews.
7. After completing reassembly, slowly open the inlet shut-off valve. Then bleed air from each chamber and from the relief valve cover by opening test cocks #4, #3, and #2. See Figure No.'s 5 and 6 for test cock locations. Slowly open outlet shut-off valve and return the valve to service.
8. Test the assembly to insure it is operating properly.

# Parts List for Model 825YB Bypass 3/4"

## SHUT-OFFS

Item	Description	Qty	Part No.
29	Ball Valve (Inlet)	1	781-053
29A	Ball Valve (Outlet)	1	781-048
30	Test Valve	4	781-074

## ASSEMBLIES / KITS

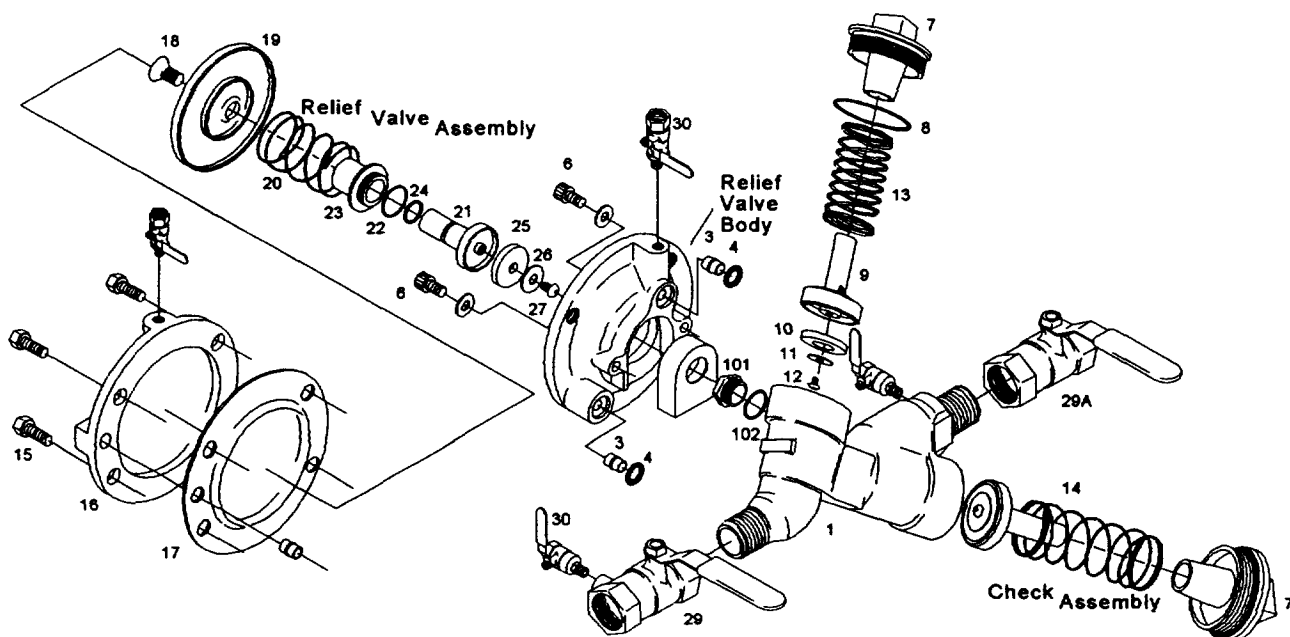
Description	Qty	Part No.
Check Valve Rubber (8 and 10)	2 ea.	905-042
Relief Valve Rubber (17, 22, 24 & 25)	1 ea.	905-043
Check Valve Assembly (8 to 12)	1 ea.	905-044
Relief Valve Assembly (17 TO 27)	1 ea.	905-045
Seat Ring Kit (101, 102)	1	905-113
Complete Rubber Parts Kit (3,4,5,8,10,17,22,24,25,102)	1	905-111

## MODEL 825YB 3/4" PARTS

Item	Description	Qty.
3	Bushing	3
4	O-Ring	2
5	Gasket	2
6	Capscrew	2
7	Cap	2
8	O-Ring	2
9	Disc Holder	2
10	Seat Disc	2
11	Washer	2
12	Screw	2
13	Spring (Inlet)	1
14	Spring (Outlet)	1
15	Bolt	4
15	Bolt	8
16	Cover	1
17	Diaphragm	1
18	Screw	1
19	Button	1
20	Spring	1
21	Mainstem	1
22	O-Ring	1
23	Guide	1
24	O-Ring	1
25	Seat Disc	1
26	Washer	1
27	Screw	1
101	Seat Ring (Relief Valve)	1
102	O-Ring (Relief Valve)	1
103	Elbow (YA only)	2
104	O-Ring (YA only)	2

## MODEL 825YB BYPASS

Figure No. 17





DIVISION OF CMB INDUSTRIES

## U.S. Sales Representative Listing

1550 N. Peach Fresno, Calif. 93727 • P.O. Box 8070 Fresno, Calif. 93747  
• Fax: (209) 453-9030

WESTERN REGION	Location	Phone	Fax
Controlled Water Sales	Fresno, CA	(209) 435-5600	(209) 435-5625
Frank Products, Inc.	Portland, OR	(503) 248-0541	(503) 248-0753
KKW, Inc.	Hayward, CA	(510) 785-0735	(510) 782-1621
Lloyd & Associates	Honolulu, HI	(808) 637-5991	(808) 637-4779
PMR Associates	Chatsworth, CA	(818) 998-0083	(818) 998-3985
Stone-Drew / Ashe & Jones, Inc.	Seattle, WA	(206) 763-2850	(206) 763-0842

CENTRAL REGION	Location	Phone	Fax
Bill Boehnlein Sales	Lakeland, MN	(612) 436-8851	(612) 436-1887
Brown-Miller, Ltd.	Hillside, IL	(708) 544-7500	(708) 544-7553
Dillon Company, Inc.	Denver, CO	(303) 399-5566	(303) 399-2114
Donahue-McGuire Sales Agency, Inc.	St. Louis, MO	(314) 664-2122	(314) 664-0767
Dworkin Company, The	Kansas City, MO	(816) 531-2505	(816) 756-0326
Mid-America Sales Group, Inc.	Grimes, IA	(515) 986-9446	(515) 986-3552
OK! Sales, Inc.	Norman, OK	(405) 360-6161	(405) 360-0092
Peak Sales, Inc.	New Berlin, WI	(414) 782-1232	(414) 782-5590
PMR Associates	Phoenix, AZ	(602) 243-6075	(602) 268-2980
Vemco Sales, Inc.	Great Falls, MT	(406) 727-5335	(406) 727-5997
Woodruff Sales, Inc.	Salt Lake City, UT	(801) 972-3023	(801) 975-9135

NORTHEAST REGION	Location	Phone	Fax
C & C Marketing, Inc.	Endicott, NY	(607) 785-5540	(607) 785-5746
Chesapeake Marketing	Lanham, MD	(301) 577-2164	(301) 577-7189
Charles R. Morrow & Sons	Springfield, PA	(215) 328-0715	(215) 328-0759
Closter Bros., Inc.	Bohemia, NY	(516) 563-3900	(516) 563-3937
De Broka & Assoc., Inc.	Sterling Heights, MI	(313) 979-5980	(313) 979-1757
Hosking Assoc., Inc.	Milford, CT	(203) 877-5841	(203) 877-8042
Kerr Marketing Agency	Cleveland, OH	(216) 582-1720	(216) 582-1842
Shadco, Inc.	Indianapolis, IN	(317) 251-9045	(317) 251-9301
Technical Marketing	Louisville, KY	(502) 425-8051	(502) 425-8170

SOUTHEAST REGION	Location	Phone	Fax
C.A. Riner Company, Inc.	Little Rock, AR	(501) 834-1400	(501) 834-1407
Coleman-Russell & Assoc., Inc.	Birmingham, AL	(205) 833-0700	(205) 836-6528
Colonial Sales Agency	Tampa, FL	(813) 621-3470	(813) 622-7863
Colonial Sales Agency	Pompano Beach, FL	(305) 785-4005	(305) 785-4006
Crouch Sales Company	Antioch, TN	(615) 834-7556	(615) 833-6690
Grant & Associates	Harahan, LA	(504) 733-2999	(504) 733-9485
Manufacturers Agents, Inc.	Atlanta, GA	(404) 351-2074	(404) 355-3969
R. L. Brown Sales	Richmond, VA	(804) 794-6994	(804) 794-5105
SPC Marketing	Monroe, NC	(704) 283-8554	(704) 283-8010
WWIP Corp.	Houston, TX	(713) 699-5778	(713) 699-0842
WWIP Corp.	Dallas, TX	(214) 243-3633	(214) 243-3632

Note: See separate listing for sales representation outside of the United States.

Revised 10/92

## BACKFLOW PREVENTION SUPPLY

962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736



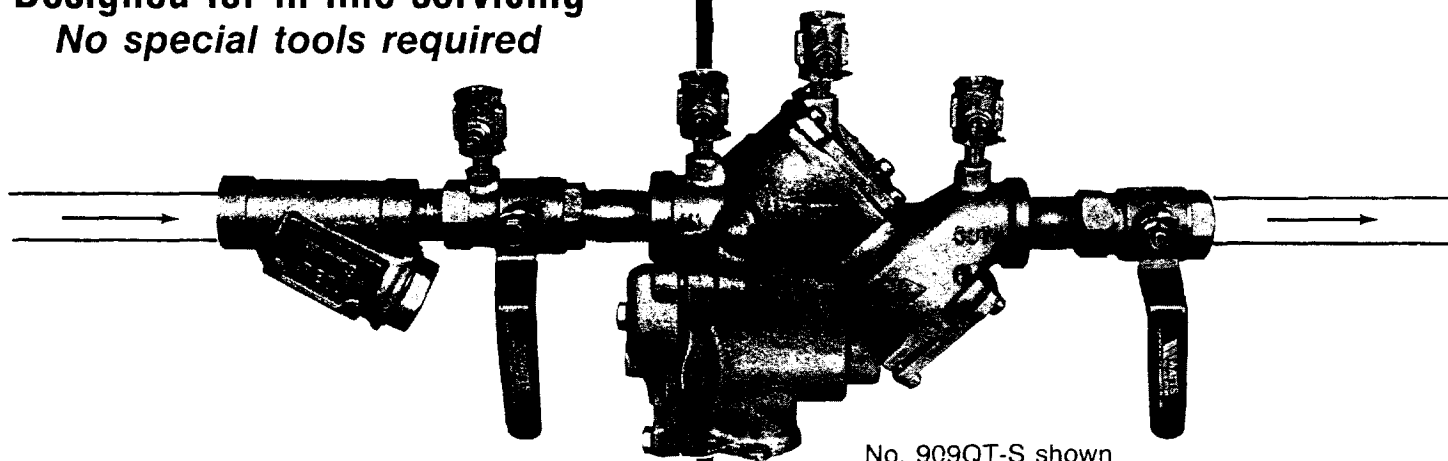
Approved by the Foundation for  
Cross-Connection Control and Hydraulic Research  
at the University of Southern California.

**Designed for in line servicing**  
**No special tools required**

# Series 909

Sizes 3/4"-2"

## REDUCED PRESSURE ZONE BACKFLOW PREVENTERS



No. 909QT-S shown

Patent Number 4,241,752

### • BACKFLOW PREVENTION • CONTAINMENT • CROSS CONNECTION CONTROL

**Suffix: Sizes 3/4" - 2"**

**QT** - with 1/4 turn, ball valve shutoffs.

**Options: (options can be combined)**

**S** - with bronze strainer.

**HW** - with stainless steel check modules

**LF** - without shutoff valves.

**Prefix U** - with integral body unions (3/4" and 1" only)

**Prefix FAE** - with flanged adapter ends (1 1/4", 1 1/2", 2" only)

#### IMPORTANT

Backflow prevention assemblies **MUST** be installed by a licensed journeyman tradesperson, who is recognized by the authority having jurisdiction, and inspected for compliance with local safety codes. Certified testing and maintenance are required to ensure proper function and maximum effectiveness of assemblies. These services must begin upon installation and be provided at intervals not to exceed one year and as system conditions warrant.

### INSTALLATION, SERVICE, REPLACEMENT PARTS and MAINTENANCE

For field testing procedure send for IS-TK-DR,  
IS-TK-DP or IS-FT-TK-9A.

For trouble shooting guide, see page 7.

For other repair kits and service parts, send for RP-BI

For technical assistance, see back page.

**"ATTN. INSTALLER: After installation, please leave  
this Instruction Sheet for occupant's information."**

World Class Valves



BACKFLOW PREVENTION DIVISION

Since 1874

**HOQTRS:** 815 Chestnut St., North Andover, MA 01845 USA

**MAIL:** Box 628, Lawrence, MA 01842

**Telex:** 94-7460

**Tel. (508) 688-1811**

**Fax: (508) 794-1848**

**Watts Industries (Canada) Ltd.**

**Tel. (416) 851-8591**

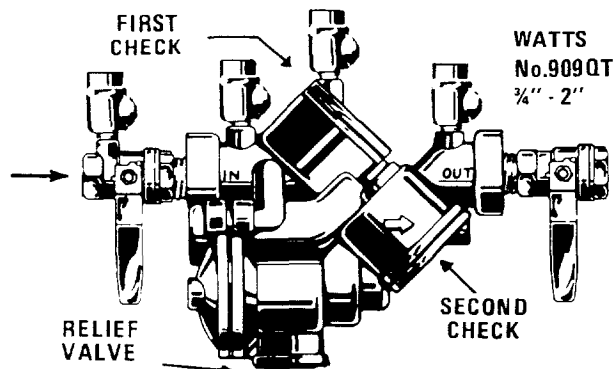
**Fax: (416) 851-8788**

**Watts Regulator (Nederland) b.v.**

**Telex: 844-35365**

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. **THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.**

# Basic Installation Instructions



Watts  $\frac{3}{4}$ " - 2" 909QT High Capacity Relief Series:  
Location and Installation Considerations

1. Backflow preventers must be installed in high-visibility locations in order to allow for immediate notice of telltale discharge or other malfunction. This location should also facilitate testing and servicing, and protect against freezing and vandalism.
2. Installing a backflow preventer in a pit or vault is not recommended as flooding of the pit will cause a cross-connection. Ensure that **all local codes and required safety provisions are met**. An air gap below the relief port must be maintained so as to avoid, flooding and submersion of the assembly, which may lead to a cross-connection.
3. A strainer should be installed ahead of the backflow preventer to protect all internal components from unnecessary fouling.  
**CAUTION** - Do not install a strainer ahead of the backflow preventer on seldom-used, emergency water lines (i.e. fire sprinkler lines). The strainer mesh could potentially become clogged with debris present in the water and cause water blockage during an emergency.
4. Normal discharge and nuisance spitting are accommodated by the use of a Watts air gap fitting and a fabricated indirect waste line. Floor drains of the same size **MUST** be provided in case of excessive discharge.
5. When a 909 Series backflow preventer is installed for dead-end service applications (i.e. boiler feed lines, cooling tower make-up or other equipment with periodic flow requirements), discharge from the relief vent may occur due to water supply pressure fluctuation during static no-flow conditions. A check valve may be required ahead of the backflow preventer. \*Please see "Troubleshooting", Page 7, **prior to installation**.
6. The 909 Series backflow preventer is designed so that the critical level of the relief valve is positioned below the first check. This unique feature allows the valve to be **installed either vertically or horizontally**. \*Please see Figure No. 3
7. **Installation procedures must comply with all state and local codes**. \*Please see page 3 for specific installation procedures.
8. Prior to installation, thoroughly flush all pipe lines to remove any foreign matter.
9. **Start up** at Initial Installations and After Servicing: The downstream shut-off should be closed. Slowly open upstream shut-off and allow the backflow preventer to fill slowly. Bleed air at each test cock. When backflow preventer is filled, slowly open the downstream shut-off and fill the water supply system. This is necessary to avoid dislodging "O" rings or causing damage to internal components.
10. **Test**: The 909 Series backflow preventer must be tested by a certified tester at the time of installation in order to ascertain that the assembly is in full working order and may be relied upon to protect the safe drinking water as per applicable standards.

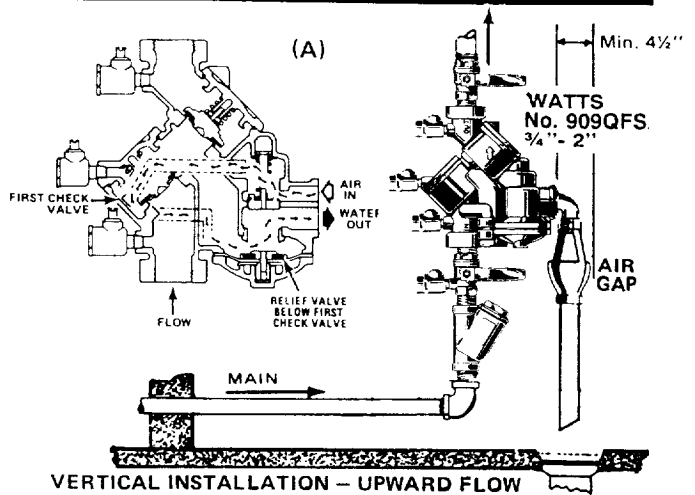
# Installation - Indoors

Figure 3

ASSE approved for vertical installation 3/4" - 2".

For indoor installations, it is important that the device be easily accessible to facilitate testing and servicing. Series 909 may be installed either vertically or horizontally. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations.

\* For Air Gap information contact your technical sales representative on back page.



# Installation - Outside Building Above Ground

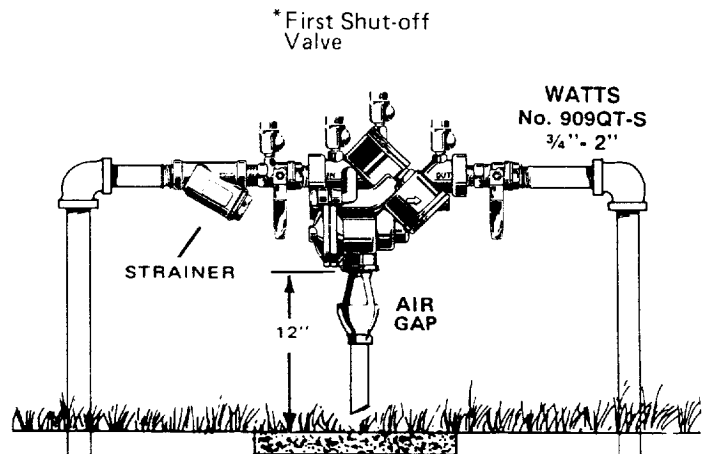
Figure 4

In an area where freezing conditions **do not occur**, Series 909 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

In an area where freezing conditions **can occur**, Series 909 should be installed in a properly insulated utility building or shelter.

Series 909 may be installed in a vertical or horizontal line and in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 909 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



# Installation - Parallel Devices

Figure 5

CONSULT LOCAL CODES FOR APPROVAL

Two or more smaller size devices can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

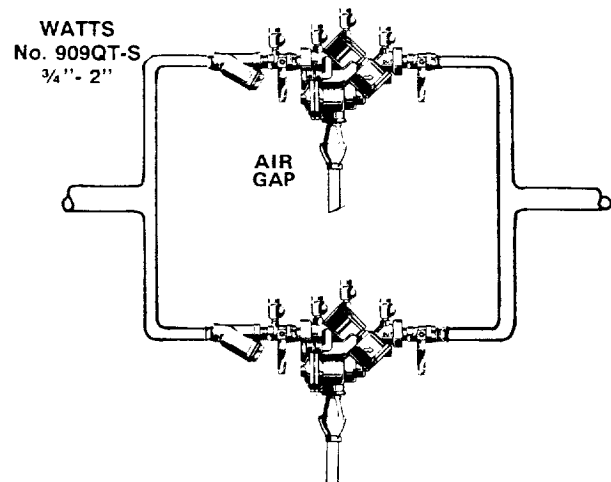
The number of devices used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.

TABLE ONE - CAPACITY REQUIRED FOR SYSTEM

50 GPM	100 GPM	150 GPM	200 GPM	250 GPM	350 GPM
Two 3/4" Devices	Two 1" Devices	Two 1 1/4" Devices	Two 1 1/2" Devices	Two 1 1/2" Devices	Two 2" Devices

Table shows total capacity provided with dual valve installations of various sizes.

(Drawings not to scale)





# Testing-Reduced Pressure Zone Backflow Preventers

Reduced pressure zone backflow preventers must be inspected and tested periodically, in accordance with local codes, to ensure proper operation of check valves within the unit.

A differential pressure gauge is recommended for Test No. 1 rather than a manometer for the following reasons: It utilizes minimum time to perform the test. It eliminates the necessity of closing the inlet shutoff valve which could release pipe scale and foreign matter into the backflow preventer. Only a slight amount of water is "spilled" in test. A mercury manometer could cause a pollution hazard.

## TEST SET UP

Close Valves (A), (B) and (C) on Test Kit.

Connect the No. 2 Test Cock of the device to the "HIGH" Hose.

Connect the No. 3 Test Cock of the device to the "LOW" Hose.

Close No. 2 shutoff valve of the device.

Open Test Cocks No. 2 and No. 3.

Open "Vent" (C) valve.

Open "High" (A) valve and bleed to atmosphere until all the air is expelled.

Close the "High" (A) valve. Open the "Low" (B) valve and bleed to atmosphere until all air is expelled. Close "Low" (B) valve. Close "Vent" (C) valve.

Connect the No. 4 Test Cock of the device to the "VENT" Hose.

## TEST PROCEDURE

### FIELD TEST EQUIPMENT REQUIRED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER TEST KIT

#### TEST No. 1

##### PURPOSE:

To test Check Valve No. 2 for tightness against reverse flow.

##### REQUIREMENTS:

Valve must be tight against reverse flow under all pressure differentials. Slowly open the "High" (A) and "Vent" (C) valves and keep the "Low" (B) valve closed. Open the No. 4 test cock. Indicated pressure differential will decrease slightly. If pressure differential continues to decrease (until the vent opens) the No. 2 Check Valve is reported as "leaking" and needs to be repaired.

#### TEST No. 2

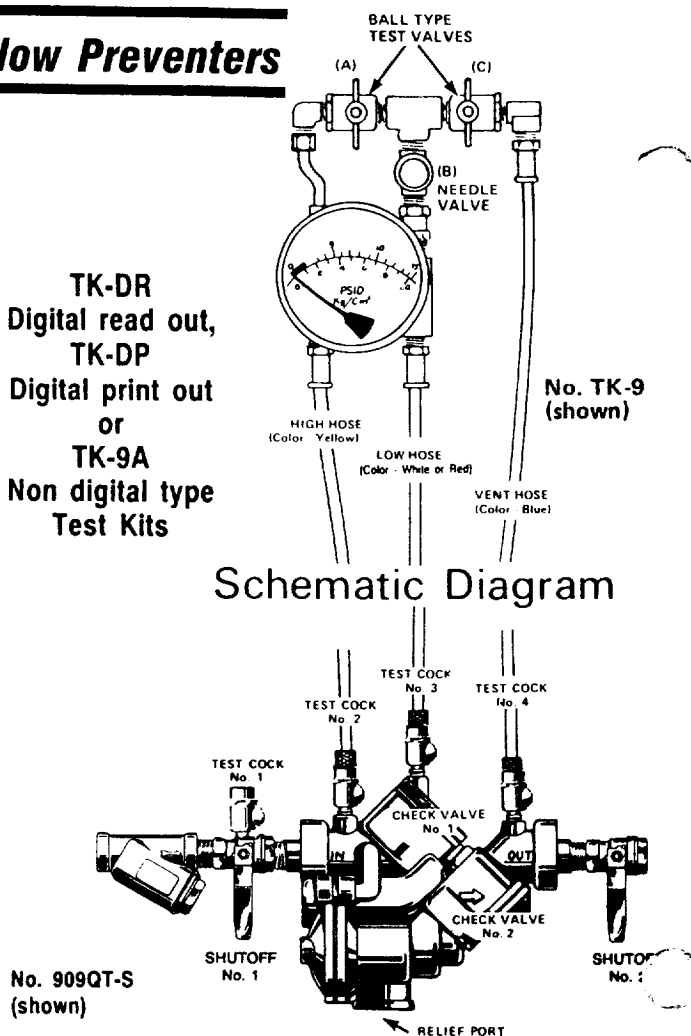
##### PURPOSE:

To test Shutoff Valve No. 2 for tightness.

**REQUIREMENTS:** After passing test No. 1 continue to test No. 2 by closing Test Cock No. 2. The indicated pressure differential will decrease slightly. If pressure differential continues to decrease (approaching "zero") the No. 2 Shutoff Valve is reported to be "leaking" and needs to be repaired.

TK-DR  
Digital read out,  
TK-DP  
Digital print out  
or  
TK-9A  
Non digital type  
Test Kits

### Schematic Diagram



#### TEST No. 3

##### PURPOSE:

To test Check Valve No. 1 for tightness.

##### REQUIREMENTS:

Valve must be tight against reverse flow under all pressure differentials. Close "High" (A) valve and open Test Cock No. 2. Close Test Cock No. 4. Disconnect "Vent" Hose at Test Cock No. 4. Open valves (B) and (C) bleeding to atmosphere, then closing valve (B) restores the system to a normal static condition. Observe the pressure differential gauge. If there is a decrease in the indicated value, the No. 1 Check Valve is reported as "leaking" and needs to be repaired.

#### TEST No. 4

##### PURPOSE:

To test operation of pressure differential relief valve.

##### REQUIREMENTS:

The pressure differential relief valve must operate and maintain the "zone" between the two check valves at least 2 psi less than the supply pressure. Close "Vent" (C) valve. Open the "High" (A) valve. Open the "Low" (B) valve very slowly until the differential gauge needle starts to drop. Hold the valve at this position and observe the gauge reading at the moment the first discharge is noted from the relief valve. Record this as the opening differential pressure of the relief valve. If pressure differential is less than 2 psi valve needs to be repaired.

**NOTE:** It is important that the differential gauge needle drops slowly.

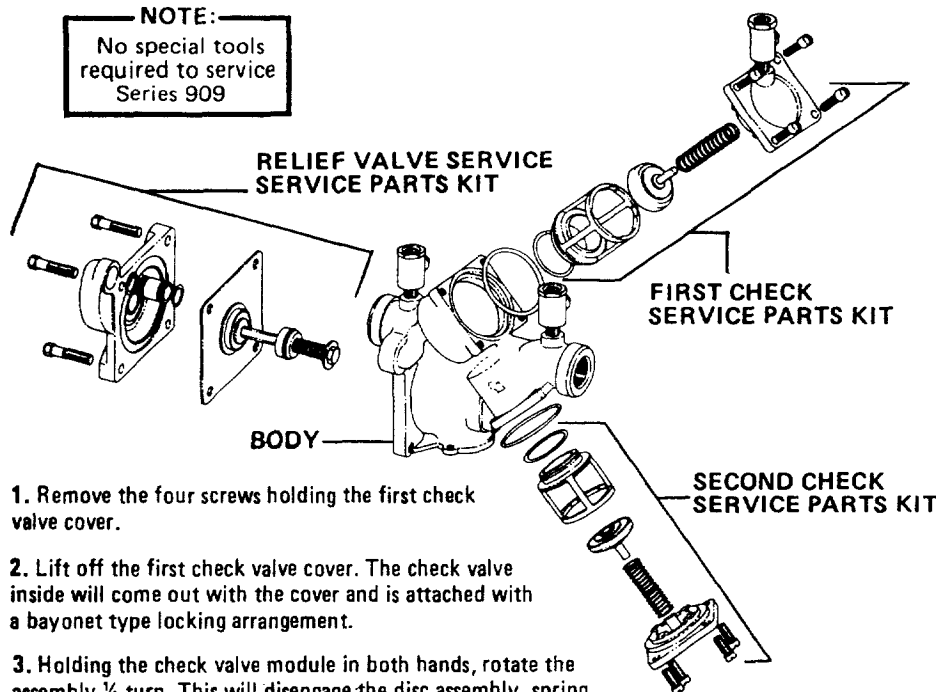
Close Test Cocks Nos. 2 and 3. Use "Vent" Hose to relieve pressure from test kit by opening valves (A), (B) and (C). Remove all test equipment and open No. 2 Shutoff valve of the device.

**CAUTION.** To prevent freezing, hold Test Kit vertically to drain differential gauge and hoses prior to placing in case.

For complete testing information send for IS-TK-DR, IS-TK-DP or IS-FT-TK-9A.

# Servicing First and Second Check Valves 3/4" to 2"

**NOTE:**  
No special tools  
required to service  
Series 909



1. Remove the four screws holding the first check valve cover.

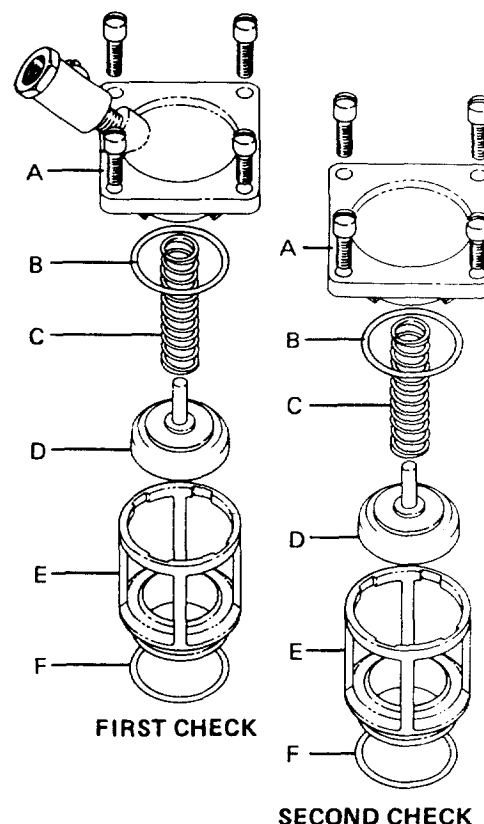
2. Lift off the first check valve cover. The check valve inside will come out with the cover and is attached with a bayonet type locking arrangement.

3. Holding the check valve module in both hands, rotate the assembly 1/4 turn. This will disengage the disc assembly, spring and seat cover into individual components.

4. The disc assembly may be cleaned and reassembled, or depending upon its condition, it may be discarded and replaced with a new assembly from the service kit. "O" rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease which is also furnished with the service kit.

5. Reassemble the check valve module in the reverse order. Service is identical for both the first and second check valves.

For further details contact your local technical sales representative, see back page.



**NOTE:** The springs and covers of the first and second check valves are not interchangeable. The heavier spring loaded module should be in the first check and the lighter in the second check module.

## 3/4" - 2" Replacement Parts

When ordering, specify Ordering Code Number, Kit Number and Valve Size

### Series 909 (All Models)-Sizes 3/4"-2" FIRST CHECK SERVICE PARTS KIT

Kit Includes:

A-Cover and Test Cock E-Seat  
B-Cover "O" Ring F-Seat "O" Ring  
C-Spring Lubricant  
D-Disk Holder

Ordering Code No.	Kit No.	Size (In.)
881466	14BFP-RK	3/4", 1"
881468	16BFP-RK	1 1/4, 1 1/2, 2"

### Series 909 (All Models)-Sizes 3/4"-2" SECOND CHECK SERVICE PARTS KIT

Kit Includes:

A-Cover E-Seat  
B-Cover "O" Ring F-Seat "O" Ring  
C-Spring Lubricant  
D-Disk Holder

Ordering Code No.	Kit No.	Size (In.)
881469	17BFP-RK	3/4", 1"
881470	18BFP-RK	1 1/4, 1 1/2, 2"

\* Note: 3/4"-2" Repair Parts Kit suitable for hot water

### Series 909 (All Models)-Sizes 3/4"-2" COMPLETE

**VALVE RUBBER PARTS KIT** Rubber Parts Kit includes "O" Rings, Check Discs, diaphragm and lubricant

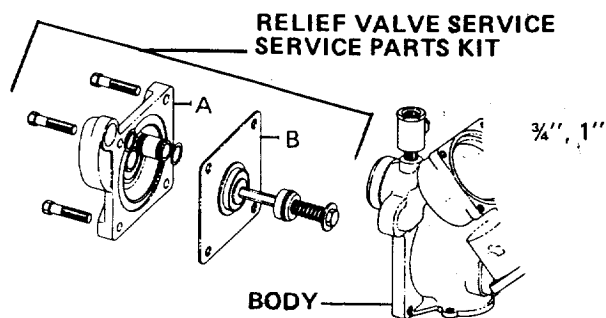
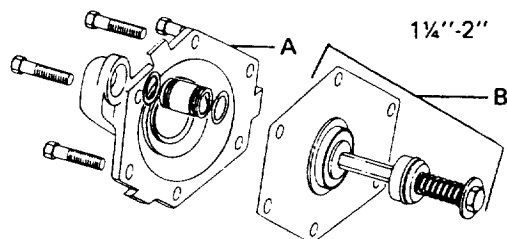
Ordering Code No.	Kit No.	Size (In.)
881321	52BFP-RK	3/4", 1"
881322	53BFP-RK	1 1/4, 1 1/2, 2"

For Rubber Parts Kit and other Repair Kits send for RP-BFP

# Servicing the Relief Valve $\frac{3}{4}$ - 2"

1. Remove the four bolts that hold the relief valve cover in place.
2. Remove the cover. The stainless steel adapter, with "O" ring attached will be free to be removed simultaneous with the removal of the cover. Pull out the relief valve assembly. Note: the spring tension in the relief valve assembly is contained in the design of the relief valve; therefore, the relief can be removed in a one-piece spool-type assembly.
3. The relief valve seat and disc may be cleaned without disassembly of the relief valve assembly. If it is determined that the relief valve diaphragm and /or disc should be replaced, the relief valve module can be readily disassembled without the use of special tools.

For further details contact your local technical sales representative, see back page.



When ordering, specify

Ordering Code Number, Kit Number and Valve Size.

## Series 909 (All Models)-Sizes $\frac{3}{4}$ "-2" RELIEF VALVE SERVICE PARTS KIT

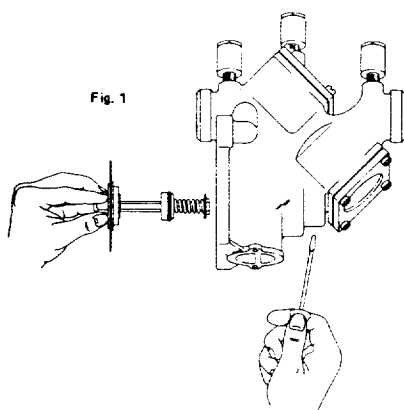
Kit Includes:

A-Cover  
B-Relief Valve Assembly  
Lubricant  
Seat  
Seat "O" Ring

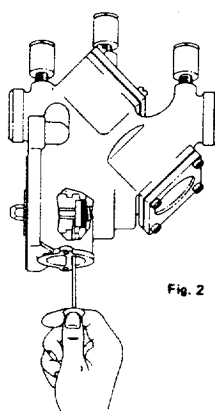
Ordering Code No.	Kit No.	Size (In.)
881481	54BFP-RK	$\frac{3}{4}$ ", 1"
881482	55BFP-RK	$1\frac{1}{4}$ ", $1\frac{1}{2}$ ", 2"

### TO PREVENT SHAFT DAMAGE ASSEMBLE AS SHOWN.

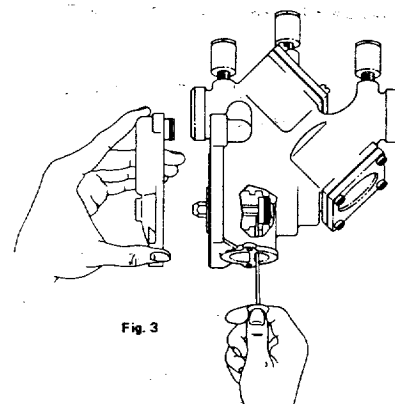
**CAUTION:** If cover will not press against body, assembly is crooked and tightening bolts will bend shaft. Do not force the cover into place as damage may result from misalignment.



**Figure 1:**  
To assemble the Relief Valve Assembly have a screwdriver ready.



**Figure 2:**  
Depress the Relief Valve Assembly, carefully guiding it against the two pound spring load. When properly aligned, the piston is in the cylinder bore. Insert the screwdriver as shown.



**Figure 3:**  
The Relief Valve Assembly is held encapsulated by the screwdriver. You should now have both hands free to bolt down the cover. Insert and snug two bolts  $180^\circ$  apart to hold the cover. Finish inserting the remaining bolts and snug up evenly and alternating until secure. Remove the screwdriver.

## TROUBLE SHOOTING GUIDE — Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
A.1 Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device. (Watts ¾"-2" No. 601 bronze valve.)	
A.2 Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve. (Watts ¾"-2" No. 601 bronze valve.)	
<b>B. Valve drips continually from the vent.</b>			
B.1 Fouled first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.	
B.2 Damaged or fouled relief valve seat.	No	B.2 Clean or replace the relief valve seat.	
B.3 Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.	
B.4 Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.	
B.5 Electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.	
B.6 Deterioration of checks due to high temp. water usage.	No	B.6 Replace plastic checks with stainless steel checks or replace complete unit with No. 909HW.	
<b>C. Valve exhibits high pressure drop.</b>			
C.1 Fouled strainer.	No	C.1 Clean strainer element or replace.	
C.2 Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.	
<b>D. No water flows downstream of valve.</b>			
D. Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.	
<b>E. Valve does not test properly.</b>			
E.1 Follow test procedure prescribed by USC foundation manual section 9.	No	E.1, E.2 Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves.	
E.2 Leaky downstream gate valve.	No		
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
F. Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.	
<b>G. Water spillage on floor.</b>			
G. Transposed checks 2½"-10" valves	No	G. If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, first check, relief valve, second check, second shut-off valve.	
<b>H. Winterization of backflow preventers.</b>			
		H. Electric heat-tape wrap closely together around valve body.	
		Build a small shelter around the valve with a large light bulb installed and left on at all times.	
		If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.	

**For technical assistance,  
contact your local Watts Master Parts Distributors:**

ACR SUPPLY CO., INC.  
2719 Hillsborough Road  
Durham, NC 27705  
(800) 442-4044  
Fax (919) 286-7106

ARMIGER ENTERPRISES, INC.  
5405 Lafayette Place  
Hyattsville, MD 20781  
(301) 779-1270  
Fax (301) 779-0127

ASTRA INDUSTRIAL SERVICES, INC.  
3525 Old Conejo Road, Ste. 104  
Newbury Park, CA 91320  
(805) 499-8729  
(800) 776-1464  
Fax (805) 499-9084

BACKFLOW PREVENTION  
SUPPLY INC.  
962 East 900 South  
Salt Lake City, UT 84105  
(801) 355-6736  
Fax (801) 355-9233  
Western States Toll Free  
(800) 733-6730

BACKFLOW APPARATUS &  
VALVE COMPANY  
156 East 162 North Street  
Gardena, CA 90248  
(310) 532-9492 • (714) 891-5605  
Fax (310) 532-0467

BACKFLOW PREVENTION  
DEVICE INSPECTIONS, INC. (BPDI)  
15840 N. 32nd Street  
Phoenix, AZ 85032  
(602) 788-5411  
(800) 266-5411  
Fax (602) 788-6104

BERGEN INDUSTRIAL  
SUPPLY CO., INC.  
30 Stefanic Ave.  
Elmwood Park, NJ 07407  
(201) 796-2600  
Fax (201) 796-5603

THE BRONSON GROUP #421  
1101 Cornwall Road  
Sanford, FL 32773  
(407) 330-1642  
(800) 462-1492  
Fax (407) 330-0049

CENTRAL ENGINEERING &  
SUPPLY COMPANY  
2422 Butler Street  
Dallas, TX 75235  
(214) 951-0270  
Fax (214) 637-0749

CLEVELAND WINDUSTRIAL  
1900 Hamilton Avenue  
Cleveland, OH 44114  
(216) 861-4333  
Fax (216) 861-5062

CONNECTICUT CROSS  
CONNECTION CO.  
59 Thompson Street  
Stratford, CT 06497  
(203) 375-3258  
Fax (203) 378-8326

FERGUSON ENTERPRISES/  
PEEBLES SUPPLY DIVISION  
618 Bland Boulevard  
Newport News, VA 23602  
(804) 874-7400  
Fax (804) 877-3767

GENERAL ELECTRIC SPECIALTY CO.  
181-04 Jamaica Avenue  
Jamaica, NY 11423  
(718) 658-2440/2441  
Fax (718) 739-6819

GENERAL PARTS & SUPPLY  
720 East Lake Street  
Minneapolis, MN 55407  
(612) 827-5581 (Twin Cities)  
Fax (612) 827-0790

NATIONAL SALES  
4201 Duncan Avenue  
St. Louis, MO 63110  
(314) 531-3200  
Fax (314) 531-4404

NOEL'S PLUMBING SUPPLY  
1200 Walnut Street  
Cincinnati, OH 45210  
(513) 721-5286  
Fax (513) 721-5947

PORTLAND PIPE & FITTING CO.  
82 Gerard Street  
Boston (Roxbury), MA 02119  
Michael O'Keefe  
(617) 442-6950  
Fax (617) 442-3919

SERVICE PIPE &  
SUPPLY, INC.  
302 S. New Jersey Street  
Indianapolis, IN 46205  
(317) 639-9308  
Fax (317) 639-4567

SOUTHERN PLUMBING SUPPLY CO.  
225 Fourth Avenue South  
Nashville, TN 37201  
(615) 256-6691  
Fax (615) 244-4621

STANCO PLUMBING SPECIALTIES  
4155 West Bellfort  
Houston, TX 77025  
(713) 664-3333  
(800) 392-5066  
Fax (713) 664-4142

V. J. STANLEY  
11 White Street  
Rochester, NY 14608  
(716) 546-4656  
Fax (716) 546-5741

VIKING II  
3300 Princeton N.E., Unit N29  
Albuquerque, NM 87190  
(505) 883-3159  
Fax (505) 883-3218

WATER SPECIALTIES CO., INC.  
8 Industrial Park Drive  
Unit 13-14  
Hooksett, NH 03106  
(603) 668-0088  
(800) 336-6530  
Fax (603) 668-0080

WATERTOWN SUPPLY  
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Watertown, MA 02172  
(617) 924-2840  
Fax (617) 924-0428

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PLUMBING SUPPLY  
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Ft. Lauderdale, FL 33304  
(305) 763-3632  
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WORLY PLUMBING SUPPLY INC.  
503 S. Front Street  
Columbus, OH 43215  
(614) 228-6679  
Fax (614) 228-0098

*World Class Valves*



— Since 1874 —

**WATTS<sup>®</sup>**  
**REGULATOR**  
WATTS REGULATOR COMPANY

*Backflow  
Prevention  
Division*

RP/IS-909S 9246  
EDP# 834246

Printed in U.S.A.

**IMPORTANT:** Inquire with governing authorities for local installation requirements.



**Factory  
Mutual  
System**

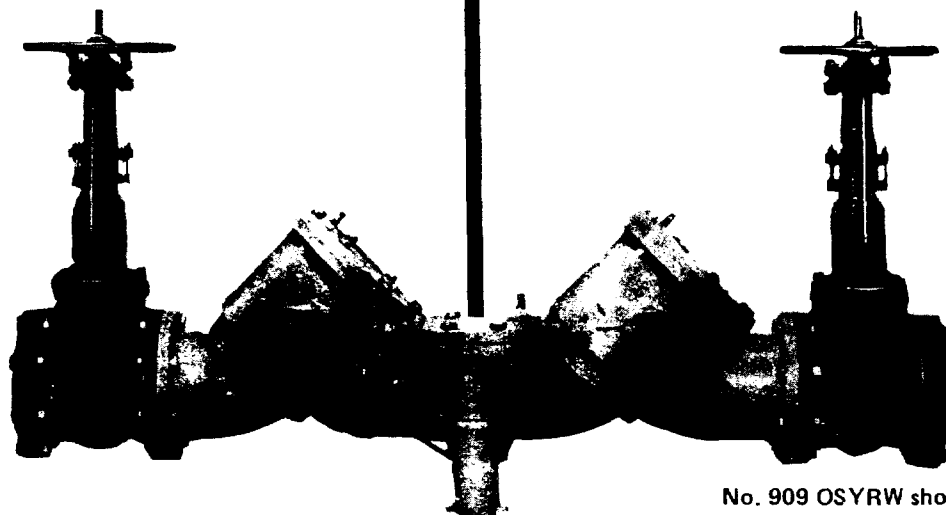
WITH OS&Y GATE VALVES

# Series 909

Sizes 2½" - 10"

**REDUCED PRESSURE  
ZONE**

**BACKFLOW PREVENTERS**



No. 909 OSYRW shown

## • BACKFLOW PREVENTION • CONTAINMENT • CROSS CONNECTION CONTROL

Standardly furnished with non-rising stem resilient-wedge gate valve shutoffs (No. 909NRSRW).

**Options:**

- S** -with FDA approved epoxy coated strainer
- BB** -with bronze body 2½", 3"
- OSYRW** -outside stem yoke & RW gate valve shutoffs
- QT** -with quarter-turn ball valve shutoffs
- QT-FDA** -with FDA epoxy coated ball valve shutoffs
- LF** -without shutoff valves

### IMPORTANT

Backflow prevention assemblies **MUST** be installed by a licensed journeyman tradesperson, who is recognized by the authority having jurisdiction, and inspected for compliance with local safety codes. Certified testing and maintenance are required to ensure proper function and maximum effectiveness of assemblies. These services must begin upon installation and be provided at intervals not to exceed one year and as system conditions warrant.

## INSTALLATION, SERVICE, REPLACEMENT PARTS and MAINTENANCE

For field testing procedure see page 4 and send for S-FT-TK-9A, IS-TK-DP or IS-TK-DR

For trouble shooting guide, see page 7

For other repair kits and service parts, send for RP-BPD

For technical assistance, see back page

**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**

World Class Valves



**WATTS  
REGULATOR**  
BACKFLOW PREVENTION DIVISION

— Since 1874 —

**HDQTRS:** 815 Chestnut St., N. Andover, MA 01845

**MAIL:** Box 628, Lawrence, MA 01842 **Telex:** 94-7460

**Tel.** (508) 688-1811

**Fax:** (508) 794-1848

**International Subsidiaries:** Watts Regulator of Canada Ltd.

**Tel.** (416) 851 8591

**Fax:** (416) 851 8788

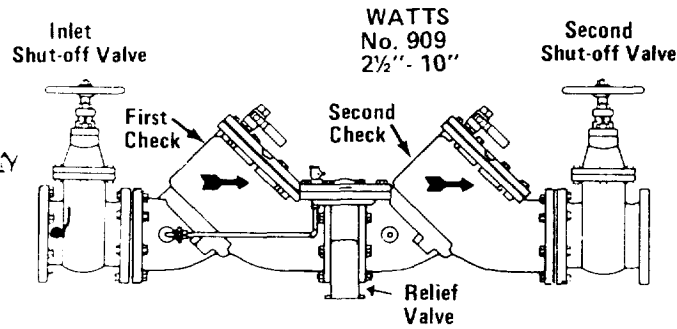
Watts Regulator (Nederland)b.v.

**Telex:** 844 35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

# Basic Installation Instructions

BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736



## Watts 2 1/2" - 10" 909 High Capacity Relief Series: Location and Installation Considerations

1. Backflow preventers must be installed in high-visibility locations in order to allow for immediate notice of telltale discharge or other malfunction. This location should also facilitate testing and servicing, and protect against freezing and vandalism.
  2. Installing a backflow preventer in a pit or vault is not recommended. However, if this becomes necessary, Watts highly recommends that a licensed journeyman tradesperson, who is recognized by the authority having jurisdiction, be consulted to ensure that **all local codes and required safety provisions are met**. An air gap below the relief port must be maintained so as to avoid flooding and submersion of the assembly, which may lead to a cross connection. \*Please refer to Figure No. 1 for further information.
  3. A strainer should be installed ahead of the backflow preventer to protect all internal components from unnecessary fouling.
- CAUTION:** Do not install a strainer ahead of the backflow preventer on seldom-used, emergency water lines (i.e. fire sprinkler lines). The strainer mesh could potentially become clogged with debris present in the water and cause water blockage during an emergency.
4. Normal discharge and nuisance spitting are accommodated by the use of a Watts air gap fitting and a fabricated indirect waste line. Floor drains of the same size **MUST** be provided in case of excessive discharge. \*Please refer to Figure no. 1 and Figure No. 2 for further information.
  5. When a 909 Series backflow preventer is installed for dead-end service applications (i.e. boiler feed lines, cooling tower make-up or other equipment with periodic flow requirements), discharge from the relief vent may occur due to water supply pressure fluctuation during static no-flow conditions. A check valve may be required ahead of the backflow preventer. \*Please see "Troubleshooting", Page 7, **prior to installation**.
  6. The 909 Series backflow preventer is designed so that the critical level of the relief valve is positioned below the first check. This unique

feature allows the valve to be **installed either vertically (flow direction down) or horizontally**. \*Please see Figure 3.

7. The relief valve module on 2 1/2" - 10" 909 Series assemblies may be turned to discharge to the opposite side. To do so, unbolt the relief valve and turn the relief valve discharge port to the opposite side. Mount the high pressure hose on the opposite. This should be done by a licensed journeyman tradesperson, who is recognized by the authority having jurisdiction and only when space is critical for testing or repair.

8. **ASSEMBLY:** If the backflow preventer is disassembled during installation, it **MUST** be reassembled in its **proper order**. The gate valve with the test cock is to be mounted on the inlet side of the backflow preventer. The test cock must be on the inlet side of the wedge. \*Please see Diagram No. 1. Failure to reassemble correctly will result in possible water damage due to excessive discharge from the relief port/vent and possible malfunction of the backflow preventer.

9. **Installation procedures must comply with all state and local codes and must be completed by a licensed journeyman tradesperson who is recognized by the authority having jurisdiction.** Please see Page 3 for specific installation procedures.

10. Prior to installation, thoroughly flush all pipe lines to remove any foreign matter.

11. **START UP at Initial Installations and After Servicing:** The downstream shut-off should be closed. Slowly open upstream shut-off and allow the backflow preventer to fill slowly. Bleed air at each test cock. When backflow preventer is filled, slowly open the downstream shut-off and fill the water supply system. This is necessary to avoid dislodging "O" rings or causing damage to internal components.

12. **TEST:** The 909 Series backflow preventer must be tested by a certified tester at the time of installation in order to ascertain that the assembly is in full working order and may be relied upon to protect the safe drinking water as per applicable standard.

Figure 1

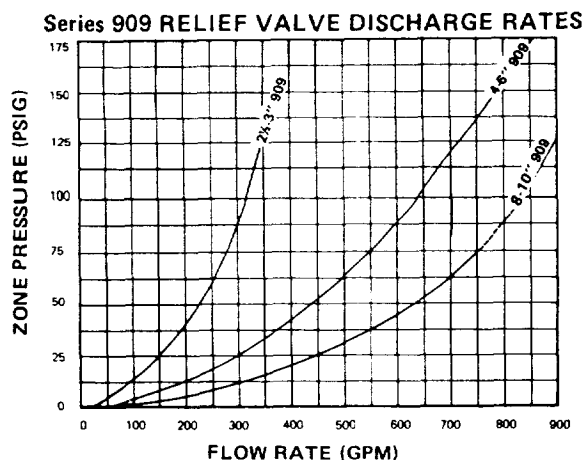


Figure 2

Typical Flow Rates  
as sized by floor  
drain manufacturers:

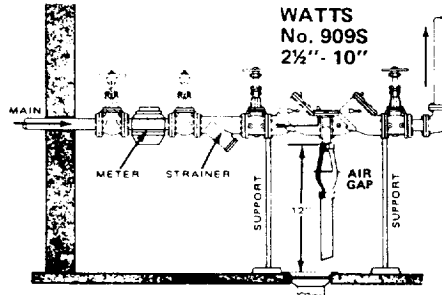
- 2" 55GPM
- 3" 112GPM
- 4" 170GPM
- 5" 350GPM
- 6" 450GPM
- 8" 760GPM

# Installation - Indoors

Figure 3

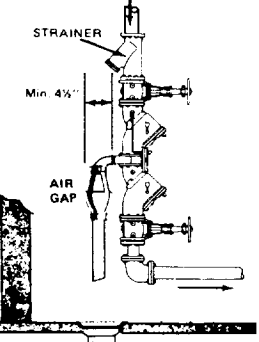
For indoor installations, it is important that the device be easily accessible to facilitate testing and servicing. Series 909 may be installed either vertically (flow direction down) or horizontally. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations.

\* For Air Gap information contact your technical sales representative on back page.



HORIZONTAL INSTALLATION

WATTS  
No. 909S  
2 1/2" - 10"



VERTICAL  
INSTALLATION -  
DOWNWARD FLOW

\*Note: For non-strainer models, test cock must be located on the first or inlet shut-off valve.

## Installation - Outside Building Above Ground

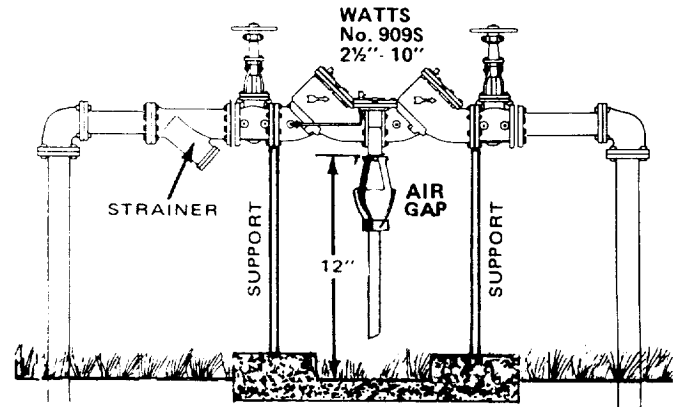
Figure 4

In an area where freezing conditions **do not** occur, Series 909 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

In an area where freezing conditions **can** occur, Series 909 should be installed in a properly insulated utility building or shelter.

Series 909 may be installed in a vertical or horizontal line and in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 909 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



NOTE: When installed vertically the direction of flow must be down.

## Installation - Parallel Devices

Figure 5

CONSULT LOCAL  
CODES FOR APPROVAL

Two or more smaller size devices can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

The number of devices used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.

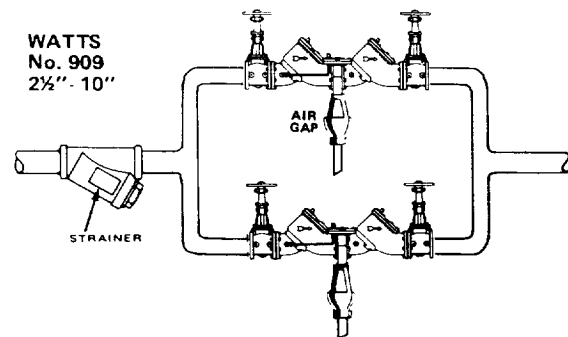


TABLE ONE - CAPACITY REQUIRED FOR SYSTEM

50 GPM	100 GPM	150 GPM	200 GPM	250 GPM	350 GPM	450 GPM	640 GPM	1000 GPM	2000 GPM	3000 GPM	5000 GPM
Two 3/4" Devices	Two 1" Devices	Two 1 1/4" Devices	Two 1 1/2" Device	Two 1 1/2" Devices	Two 2" Devices	Two 2 1/2" Devices	Two 3" Devices	Two 4" Devices	Two 6" Devices	Two 8" Devices	Two 10" Devices

Table shows total capacity provided with dual valve installations of various sizes.

(Drawings not to scale)



# Testing-Reduced Pressure Zone Backflow Preventers

Reduced pressure zone backflow preventers must be inspected and tested periodically, in accordance with local codes, to ensure proper operation of check valves within the unit.

A differential pressure gauge is recommended for Test No. 1 rather than a manometer for the following reasons: It utilizes minimum time to perform the test. It eliminates the necessity of closing the inlet gate valve which could release pipe scale and foreign matter into the backflow preventer. Only a slight amount of water is 'spilled' in test. A mercury manometer could cause a pollution hazard.

## TEST SET UP

Close Valves (A), (B), and (C) on Test Kit.

Connect the No. 2 Test Cock of the device to the "HIGH" Hose. (Color - Yellow)

Connect the No. 3 Test Cock of the device to the "LOW" Hose. (Color - White)

Close No. 2 gate valve of the device.

Open Test Cocks No. 2 and No. 3.

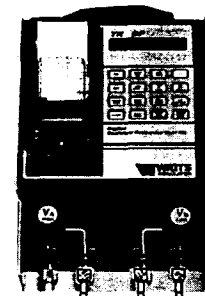
Open "Vent" (C) valve.

Open "High" (A) valve and bleed to atmosphere until all the air is expelled.

Close the "High" (A) valve. Open the "Low" (B) valve and bleed to atmosphere until all air is expelled. Close "Low" (B) valve. Close "Vent" (C) valve.

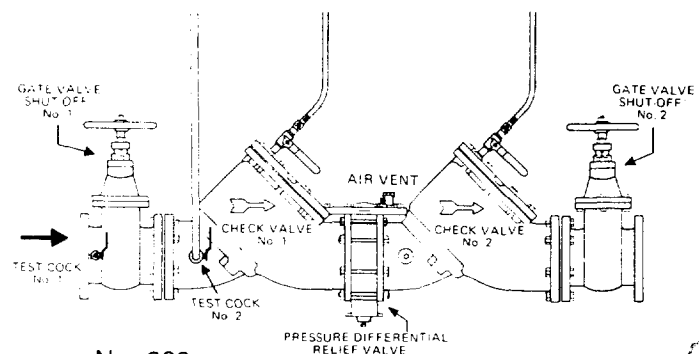
Connect the No. 4 Test Cock of the device to the "VENT" Hose. (Color - Blue)

## TK-DP Test Kit



HIGH HOSE  
(Color - Yellow)      LOW HOSE  
(Color - White)      VENT HOSE  
(Color - Blue)

## Schematic Diagram



No. 909  
(shown)

## TEST PROCEDURE

### FIELD TEST EQUIPMENT REQUIRED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER TEST KIT

#### TEST No. 1

##### PURPOSE:

To test Check Valve No. 2 for tightness against reverse flow.

##### REQUIREMENTS:

Valve must be tight against reverse flow under all pressure differentials. Slowly open the "High" (A) and "Vent" (C) valves and keep the "Low" (B) valve closed. Open the No. 4 test cock. Indicated pressure differential will decrease slightly. If pressure differential continues to decrease (until the vent opens) the No. 2 Check Valve is reported as "leaking" and needs to be repaired.

#### TEST No. 2

##### PURPOSE:

To test Gate Valve No. 2 for tightness.

**REQUIREMENTS:** After passing test No. 1 continue to test No. 2 by closing Test Cock No. 2. The indicated pressure differential will decrease slightly. If pressure differential continues to decrease (approaching "zero") the No. 2 Gate Valve is reported to be "leaking" and needs to be repaired.

#### TEST No. 3

##### PURPOSE:

To test Check Valve No. 1 for tightness.

##### REQUIREMENTS:

Valve must be tight against reverse flow under all pressure differentials. Close "High" (A) valve and open Test Cock No. 2. Close Test Cock No. 4. Disconnect "Vent" Hose at Test Cock No. 4. Open valves (B) and (C) bleeding to atmosphere, then closing valve (B) restores the system to a normal static condition. Observe the pressure differential gauge. If there is a decrease in the indicated value, the No. 1 Check Valve is reported as "leaking" and needs to be repaired.

#### TEST No. 4

##### PURPOSE:

To test operation of pressure differential relief valve.

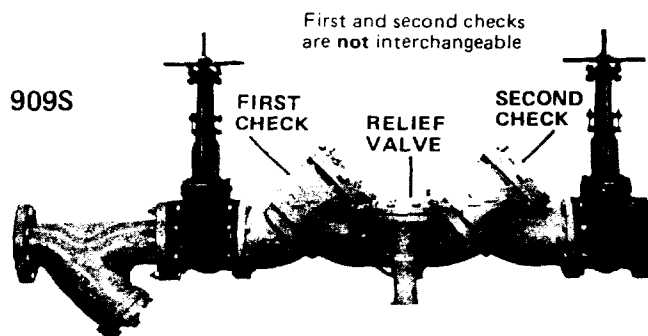
##### REQUIREMENTS:

The pressure differential relief valve must operate and maintain the "zone" between the two check valves at least 2 psi less than the supply pressure. Close "Vent" (C) valve. Open the "High" (A) valve. Open the "Low" (B) valve very slowly until the differential gauge needle starts to drop. Hold the valve at this position and observe the gauge reading at the moment the first discharge is noted from the relief valve. Record this as the opening differential pressure of the relief valve. If pressure differential is greater than 2 psi valve needs to be repaired.

**NOTE:** It is important that the differential gauge needle drops slowly.

Close Test Cocks Nos. 2 and 3. Use "Vent" Hose to relieve pressure from test kit by opening valves (A), (B) and (C). Remove all test equipment and open No. 2 gate valve of the device.

# Servicing First and Second Checks 2½" - 10"



First and second checks are not interchangeable

**NOTE:**  
No special tools required to service Series 909

1. Remove the hatch cover bolts. NOTE: The 909 is designed so that when the bolts are backed off ½", all the spring load is released from the cover and retained by the check module. **CAUTION: Be sure to verify this before removing all the bolts.**
2. Lift the check valve module straight out taking care not to hit and damage the seat ring.
3. The seat ring may be removed and replaced by pulling out the two wire retainers on sizes 4"- 10" while on sizes 2½"- 3", one quarter-turn twist removes seat. The wire retainers are 10" long. One is drawn out clockwise and the other is drawn out counter clockwise.
4. With the retainer wires removed, the seat ring can be lifted straight up and removed.

## Series 909 (All Models)- Sizes 2½"-3" FIRST AND SECOND CHECK SERVICE PARTS KIT

Kit includes:

- A- Disc & Spring Assembly C- Seat "O" Ring  
B- Seat D- Cover "O" Ring

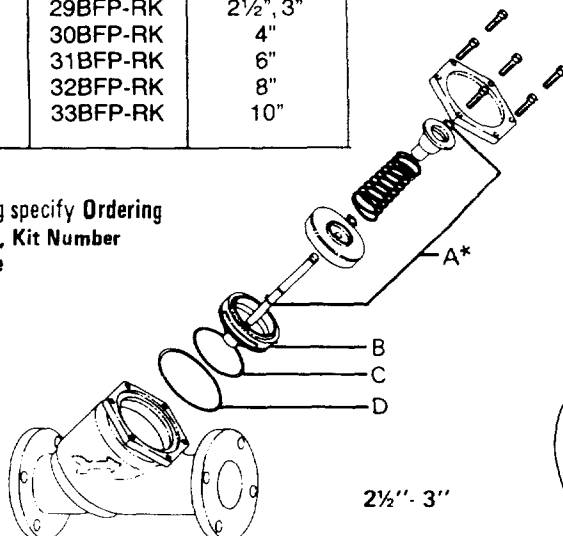
Ordering Code No.	Kit No.	Size (In.)	Description
881471	19BFP-RK	2½", 3"	1st Check Service Kit
881476	24BFP-RK	2½", 3"	2nd Check Service Kit

## Series 909 (All Models)- Sizes 2½"-10" FIRST AND SECOND CHECK SERVICE RUBBER PARTS KIT

Kit Includes: "O" Rings, Check Discs, Lubricant

Ordering Code No.	Kit No.	Size (In.)
833901	29BFP-RK	2½", 3"
881335	30BFP-RK	4"
881340	31BFP-RK	6"
881348	32BFP-RK	8"
881352	33BFP-RK	10"

When ordering specify **Ordering Code Number, Kit Number and Valve Size**



2½" - 3"

5. **CAUTION:** The check valve spring is in compression. The spring load is captured by the two spring retainers and the stem. The spring retainers are not to be removed for servicing. If there is a need to replace the spring, spring retainer or stem, an assembled module must be obtained from the factory. These modules are not interchangeable, be sure to replace the first check with a first check module and the second check with a second check module.

6. To replace the disc on sizes 2½"- 4" simply remove the retaining nut or for sizes 6"- 10" remove the allen head socket screws. Reverse this procedure to install the new disc.

For further details contact your technical sales representative, see back page.

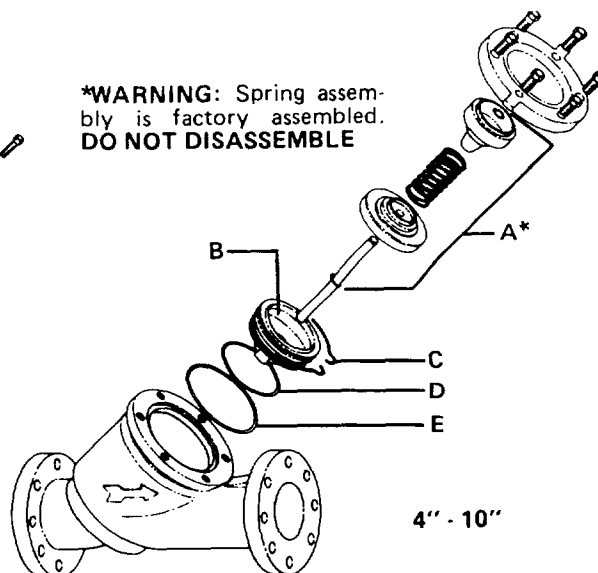
## Series 909 (All Models)- Sizes 4"-10" FIRST AND SECOND CHECK SERVICE PARTS KIT

Kit Includes:

- A- Disc & Spring Assembly C- Seat "O" Ring  
B- Seat D- Cover "O" Ring

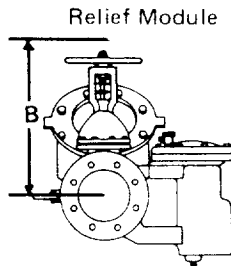
Ordering Code No.	Kit No.	Size Inches	Description
881472	20BFP-RK	4"	1st Check Service Kit
881473	21BFP-RK	6"	1st Check Service Kit
881474	22BFP-RK	8"	1st Check Service Kit
881475	23BFP-RK	10"	1st Check Service Kit
881477	25BFP-RK	4"	2nd Check Service Kit
881478	26BFP-RK	6"	2nd Check Service Kit
881379	27BFP-RK	8"	2nd Check Service Kit
881480	28BFP-RK	10"	2nd Check Service Kit

**\*WARNING:** Spring assembly is factory assembled. DO NOT DISASSEMBLE



4" - 10"

# Servicing the Relief Valve 2½" - 10"



Clearance  
Required for Servicing

	A	B
2½-3	10"	11"
4	15"	14"
6	15"	16"
8	23"	21"
10	25"	21"

1. Remove the relief valve cover bolts. Note the 909 is designed so that when the bolts are backed off ½" all the relief valve spring load is retained by the bottom plug spring module. **CAUTION:** Be sure to verify this before removing all the bolts.

2. Remove the cover and diaphragm (A). The relief valve piston assembly (B) can be lifted straight up and out.

3. Replace the wiper seal and piston "O" ring and apply grease to the "O" ring.

4. To replace the relief valve disc, hold the upper guide fin and unscrew the diaphragm pressure plate. It may be necessary to lightly tap the cast webs and the pressure plate to loosen. Replace with a new disc holder assembly and "O" ring. Note: the disc rubber is molded into the disc holder and is supplied as a disc holder assembly.

5. Removal of the bottom spring assembly (E). During normal field service there is no need to remove the bottom plug spring assembly other than inspection. It can be removed by simply unscrewing with a large pipe wrench.

**CAUTION:** The spring as retained on the bottom plug is highly loaded. NO attempt should be made in the field to remove the spring. For replacement, a complete bottom plug assembly must be obtained from the factory.

For further details contact your technical sales representative, see back page.

## Series 909 (All Models)-Sizes 2½"-3" RELIEF VALVE SERVICE KIT

Kit Includes:

A - Diaphragm C - Seat  
B - Relief Valve Assembly D - "O" Ring and Lubricant

Ordering Code No.	Kit No.	Size (In.)
881483	59BFP-RK	2½", 3"

## Series 909-Sizes 4"-10" RELIEF VALVE SERVICE PARTS KIT

Kit includes:

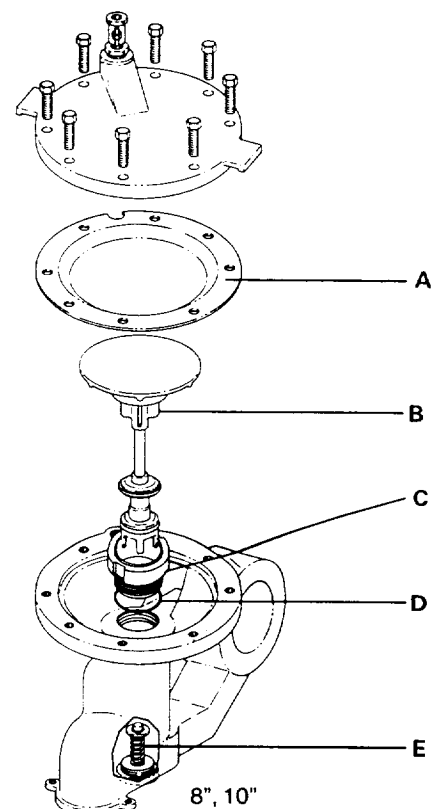
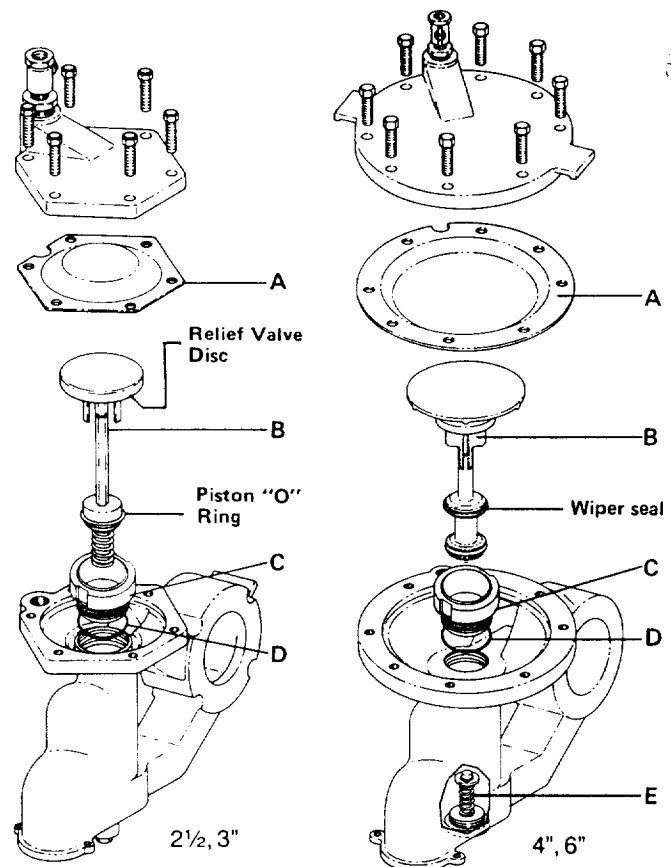
A-Diaphragm D-"O" Ring  
B-Relief Valve Assembly E-Bottom Plug and Assembly and Lubricant  
C-Seat

Ordering Code No.	Kit No.	Size (In.)
881484	60BFP-RK	4", 6"
881485	61BFP-RK	8", 10"

## Series 909-Sizes 2½"-10" RELIEF VALVE RUBBER PARTS KIT †

Kit Includes "O" Rings, Check Discs, Diaphragm, Piston Seal, Lubricant

Ordering Code No.	Kit No.	Size (In.)
833902	56BFP-RK	2½", 3"
881345	57BFP-RK	4", 6"
881350	58BFP-RK	8", 10"



6 †Note: To replace all rubber in a Complete Valve requires both the first and second check valve rubber parts kit and relief valve rubber parts kit.

# TROUBLE SHOOTING GUIDE – Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
A.1	Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device. (Watts ¾"-2" No. 601 bronze valve.)
A.2	Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve. (Watts ¾"-2" No. 601 bronze valve.)
<b>B. Valve drips continually from the vent.</b>			
B.1	Fouled first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
B.2	Damaged or fouled relief valve seat.	No	B.2 Clean or replace the relief valve seat.
B.3	Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.
B.4	Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
B.5	Electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
B.6	Deterioration of checks due to high temp. water usage.	No	B.6 Replace plastic checks with stainless steel checks or replace complete unit with No. 909HW.
<b>C. Valve exhibits high pressure drop.</b>			
C.1	Fouled strainer.	No	C.1 Clean strainer element or replace.
C.2	Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.
<b>D. No water flows downstream of valve.</b>			
D.	Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.
<b>E. Valve does not test properly.</b>			
E.1	Follow test procedure prescribed by USC foundation manual section 9.	No	E.1, E.2 Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves.
E.2	Leaky downstream gate valve.	No	
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
F.	Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.
<b>G. Water spillage on floor.</b>			
G.	Transposed checks 2½"-10" valves	No	G. If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, <b>first</b> check, relief valve, <b>second</b> check, second shut-off valve.
<b>H. Winterization of backflow preventers.</b>			
			H. Electric heat-tape wrap closely together around valve body.
			Build a small shelter around the valve with a large light bulb installed and left on at all times.
			If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.

# For Technical Assistance Call Your Authorized Watts Agent

		Telephone #	Fax #
<i>Bruce Parrott, N.E. Reg. Mgr.</i>	815 Chestnut St., North Andover, MA 01845	508 688-1811	508 794-1848
Trayco Sales, Inc.	P.O. Box 653, Lynnfield, MA 01940	617 334-6078	617 334-2859
W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691	203 873-8693
WMS Sales, Inc.	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
WMS Sales, Inc.	7437 Meadowbrook Dr., Baldwinsville, NY 13027	315 622-0763	315 622-0764
WMS Sales, Inc.	4 McMillen Place, Delmar, NY 12054	518 475-1017	
Edwards, Platt & Deely, Inc.	931A Conklin St., Farmingdale, NY 11735	516 777-3800	516 777-3810
J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	412 745-5300	412 745-7420
Vernon Bitzer Associates, Inc.	138 Railroad Dr., Northhampton Ind. Pk., Ivyland, PA 18974	215 953-1400	215 953-1250
<i>Bill Johnson, S.E. Reg. Director</i>	P.O. Box 140153, Orlando, FL 32814-0153	407 895-3461	407 895-3462
RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
Smith & Stevenson	4935 Chastain Ave., Charlotte, NC 28210	704 525-3388	704 525-6749
Central Sales Company	1612 Fourth Ave. North, Nashville, TN 37208	615 259-9022	615 259-9024
Central Sales Company	2170 York Ave., Memphis, TN 38104	901 278-2251	901 272-1614
Spotswood Associates	6700 Best Friend Rd., Norcross, (Atlanta) GA 30071-2919	404 447-1227	404 263-6899
Distributor Sales of Florida	6520 35th St. North, Pinellas Park, FL 33565	813 527-6651	813 528-0602
Earl L. Griffin Co.	2776 B.M. Montgomery St., Birmingham, AL 35209	205 879-3469	205 870-5027
Earl L. Griffin Co.	6517 Buggy Whip Court, Mobile, AL 36695	205 661-1199	
Billingsley & Associates, Inc.	5609-D Salmen St., Harahan, LA 70123	504 733-7624	504 733-6904
Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
Francisco J. Ortiz & Co., Inc.	P.O. Box 1433, Carolina, Puerto Rico 00984	809 769-0085	809 750-5120
The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
Hugh M. Cunningham, Inc.	4309 N. Beltwood Pkwy., Dallas, TX 75244-3294	214 661-0222	214 490-6678
Hugh M. Cunningham, Inc.	1999 Kofahl, Houston, TX 77023	713 923-2371	713 923-8357
Hugh M. Cunningham, Inc.	5130 Service Center, San Antonio, TX 78218	512 661-4161	512 661-0954
<i>Don Sinsabaugh, Midwest Reg. Sales Mgr.</i>	42 W. 597 Steeple Chase, St. Charles, IL 60175	708 377-3671	708 513-5063
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	708 953-1211	708 953-1067
Mid-Continent Marketing Services Ltd.	5508 Elmwood Ave., Suite 401, Indianapolis, IN 46203	317 782-1515	317 782-4360
Advance Industrial Marketing Ltd.	1606 Commerce Dr., Sun Prairie, WI 53590	608 837-5005	608 837-2368
Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
The Harris-Billings Co.	P.O. Box 41304, 1920 Annapolis Lane North, Plymouth, MN 55441	612 559-9400	612 559-8239
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-5049
Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
Mack McClain & Associates, Inc.	16037 "N" Circle, Omaha, NE 68135	402 896-8804	402 896-8807
Pro-Spec, Inc.	P.O. Box 472226, Tulsa, OK 74145	918 664-5642	918 664-6069
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, MO 63143	314 644-5454	314 644-5527
Disney-McLane, Inc.	2704 Colerain Ave., Cincinnati, OH 45225	513 541-1682	513 541-0073
Madsen-Bayer & Associates, Inc.	2510 Englewood Dr., Columbus, OH 43219	614 476-1833	614 476-1846
Madsen-Bayer & Associates, Inc.	4640 Warner Rd., Garfield Heights, OH 44125	216 641-5808	216 641-5546
Gary S. Gilpin Sales Co.	4468 Emberson Ave., Louisville, KY 40209	502 367-2178	502 367-9080
<i>Jim Engard, West Reg. Sales Mgr.</i>	749 Renate Way, Paso Robles, CA 93446	805 239-8852	805 239-8859
Steve Govero, Market Mgr. Backflow	276 Ginger Lane, Paso Robles, CA 93446	805 237-2413	805 237-2265
R. C. Hartnett & Associates	30852 Huntwood Ave., Hayward, CA 94544	510 471-7200	510 471-4441
Hollabaugh Brothers & Associates	1260 6th Ave. South, Seattle, WA 98134-1308	206 467-0346	206 467-8368
Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
R. E. Fitzpatrick Sales, Inc.	16 East 8th Ave., Midvale, UT 84047	801 566-7156	801 566-4979
Fanning & Associates, Inc.	625 East 70th Ave., Denver, CO 80229	303 289-4191	303 286-9069
Benisek-Klapp & Associates	2267 Yates Ave., City of Commerce, CA 90040	213 887-2080	213 887-2090
Plumbing/Industrial Representatives	2012 West 4th St., Tempe, AZ 85281	602 968-8586	602 829-7682
Rocky Mountain Marketing	3300 Princeton N.E., N-27, Albuquerque, NM 87107	505 883-4405	505 881-3767
Crown Sales	360 Mokaua St., Honolulu, HI 96819	808 845-7881	808 841-4504
<b>HDQTRS: Watts Regulator Co./EXPORT</b>	815 Chestnut St., North Andover, MA 01845 Telex: 94-7460	508 688-1811	508 794-1848
Watts Regulator of Canada Ltd.	441 Hanlan Rd., Woodbridge, Ontario L4L 3T1, Canada	416 851-8591	416 851-8788
Walmar	24 Gurdwara Rd., Nepean, Ontario K2E 8A2	613 225-9774	613 225-0673
Currie Agencies Ltd.	3117 Underhill Ave., Burnaby, British Columbia V5A 3C8	604 420-6070	604 420-9022
Polymex Controles Inc.	1375 Boul Charest Ouest, Suite 6, Quebec City, Quebec G1N 2E7	418 682-1690	418 682-8743
Watts Regulator of Canada Ltd.	2690 Sabourin, Ville St. Laurent, Quebec H4S 1M2	514 337-9010	514 337-8843
Krovats/Gregg Associates	941-C Erin St., Winnipeg, Manitoba R3G 2W6	204 786-2747	204 775-3186
DC Sales Corp.	6031-3th St. S.E., Calgary, Alberta T2H 2A5	403 253-6808	403 259-8331
W.B. Gingerich Sales Ltd.	107 Hamilton Rd., New Hamburg, Ontario NOB 2G0	519 662-2460	519 662-2491
Fetterly & Associates	6080 Young St., Suite 911, Halifax, Nova Scotia B3K 5L8	902 454-9377	902 454-6085
Watts Regulator of Nederland b.v.	P.O. Box 98, 6960 AB Eerbeek, Holland Telex: 844-35365	(011) 31-8-338-59028	8-338-52073

World Class Valves



**Backflow  
Prevention  
Division**

RP/IS-909L 9226 Printed in U.S.A.

## BACKFLOW PREVENTION SUPPLY

962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

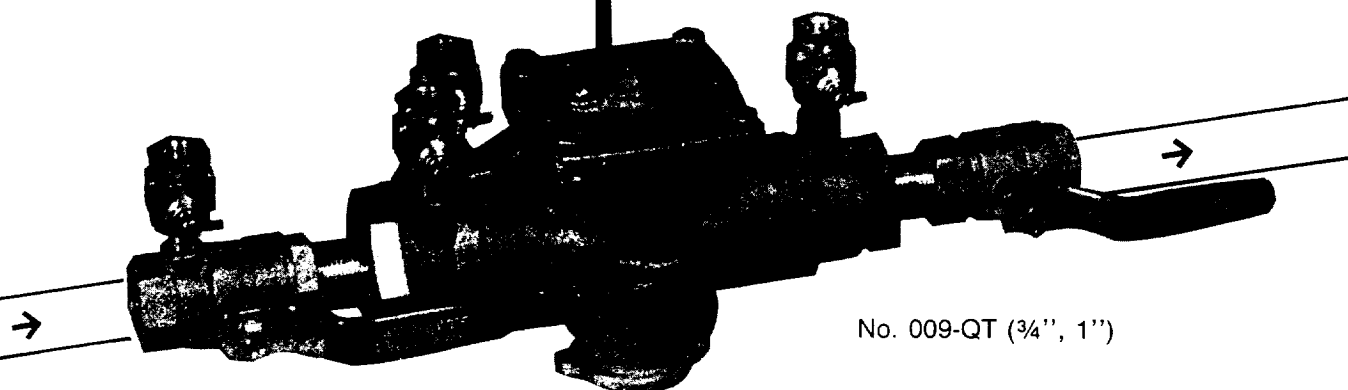
Sizes 1/2", 3/4", 3/4"-M2,  
1", 1 1/4", 1 1/2", 2"

For sizes 2 1/2" and 3" see RP/IS 009L

"ATTN. INSTALLER: After installation,  
please leave this Instruction Sheet for  
occupant's information."

# Series 009

## REDUCED PRESSURE ZONE BACKFLOW PREVENTERS



No. 009-QT (3/4", 1")

### • BACKFLOW PREVENTION • CONTAINMENT • CROSS CONNECTION CONTROL

No. 009QT supplied with quarter-turn, full port, resilient seated, bronze ball valve shut-offs

Options: Suffix

S - with bronze strainer

SS - with stainless steel replaceable check seats for aggressive water conditions.

LF - without shut-off valves

QT-T - for "T" handle ball valve shut-offs

Prefix U - with union connections

For NRS-RW gate valves shut-offs,  
order No. 009

## INSTALLATION SERVICE REPLACEMENT PARTS and MAINTENANCE

For field testing procedure, send for F-TKDP/TKDR  
or S-FT-TK-9A.

For trouble shooting guide, see page 7.

For other repair kits and service parts, send for RP-BFP.

For additional information, see sales reps. on back page.

World Class Valves



Since 1874

HDQTRS: 815 Chestnut St., N. Andover, MA 01845

MAIL: Box 628, Lawrence, MA 01842 Telex: 94-7460

Tel. (508) 688-1811 Fax: (508) 794-1848/794-1674

International Subsidiaries: Watts Regulator of Canada Ltd.

Tel. (416) 851 8591 Fax: (416) 851 8788

Watts Regulator (Nederland) b.v. Telex: 844 35365

LIMITED WARRANTY: Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

# INSTALLATION INSTRUCTIONS

## Series 009 - Sizes ½" through 2"

**A.** Series 009 may be installed in a vertical or horizontal position. When installed vertically, the direction of flow must be **down**. This positions the relief valve below the first check valve enabling the zone to drain through the relief valve outlet.

**Note: Shut-off Valves:** Installation of models when shut-off valves are shipped separately, the shut-off valve with the test cock is to be mounted on the inlet side of the backflow preventer.

**B.** The 009 should always be installed in an accessible location to facilitate testing and servicing. Check the state and local codes to insure that the backflow preventer is installed in compliance, such as the proper height above the ground.

**C.** Watts recommends a strainer be installed (fig. 1) ahead of No. 009 series assemblies to protect the discs from unnecessary fouling.

**Caution:** Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon only during emergencies, such as fire sprinkler lines.

**Start Up:** The downstream shut-off should be closed. Open upstream slowly and fill valve. When valve is filled, open the downstream shut-off slowly and fill the water supply system. This is necessary to avoid water hammer or shock damage.

**D.** Water discharge from the relief valve should be vented in accordance with code requirements. The relief valve should never be solidly piped into a drainage ditch, sewer or sump. The discharge should be terminated approximately 12" above the ground or through an air gap piped to a floor drain.

### NOTE: Relief Valve Discharge Rates

The installation of an air gap with the drain line terminating above a floor drain will handle any normal discharge or nuisance spitting through the relief valve. However, floor drain size may need to be designed to prevent water damage caused by a catastrophic failure condition. Please refer to Figure No. 4 for relief valve discharge rates, size and capacity for typical floor drains.

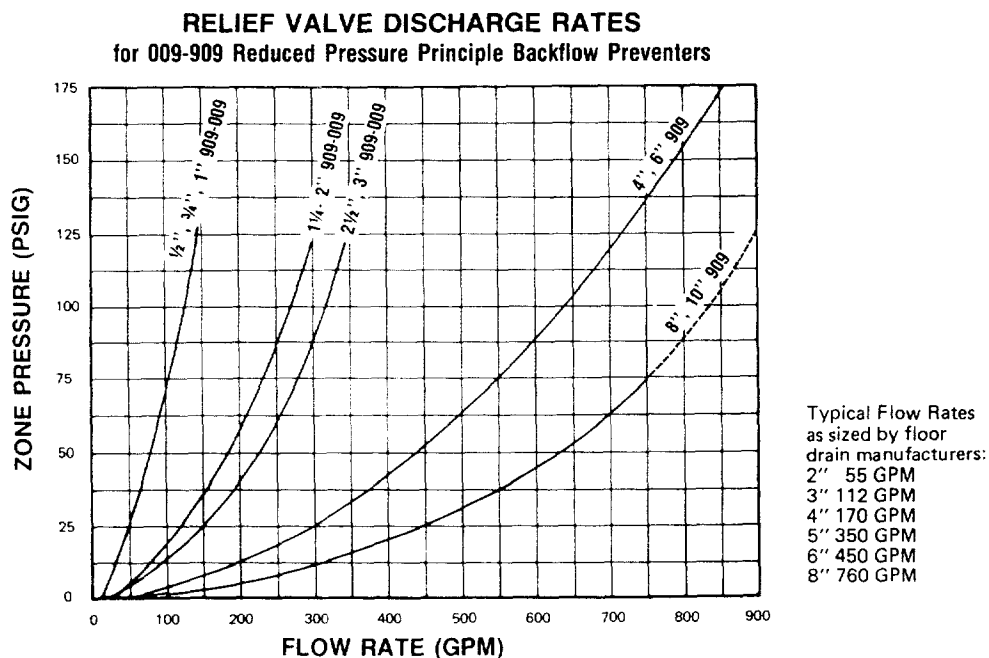


Figure No. 4

**NOTE:** Do not reduce the size of the drain line from the air gap fitting. Pipe full line size.

**E.** After initial installation, a discharge from the relief valve opening may occur until all seating surfaces have become seated or due to inadequate initial flushing of pipe lines to eliminate dirt and pipe compounds. If flushing will not clear, remove the first check valve and clean thoroughly.

**NOTE:** Periodic relief valve discharge may occur on dead end service applications, such as boiler feed lines or cooling tower make-up lines due to fluctuating supply pressure during a static or no flow condition. To avoid this discharge, install a check valve ahead of the backflow assembly to "lock-in" the downstream pressure.

**F.** Backflow preventers should never be placed in pits unless absolutely necessary and then only when and as approved by local codes. In such cases, provision should be made to always vent above flood level or for a pit drain to insure an adequate air gap below the relief port. Consult your local or state plumbing or health inspector.

**G.** It is important that Series 009 backflow preventers be inspected periodically for any discharge from the relief valve which will provide a visual indication of need for cleaning or repair of check valves. Also testing for proper operation of the assembly should be made periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions. Send for S-FT-TK9A, IS-TK-DP and IS-TK-DR instruction manuals for test procedures.

**NOTE: Fire Protection System Installations:** The National Fire Protection Agency (NFPA) Guidelines require a confirming flow test be conducted whenever a "main line" valve such as the shut-off valves or a backflow assembly have been operated. Certified testers of backflow assemblies must conduct this confirming test. The trim valves of the detector meter by-pass line on assemblies so equipped must be shut-off during the flow test. When the test is completed the trim valve must be returned to a fully open position.

**H.** Relief vent will discharge water when, during no-flow periods (1) the first check valve is fouled, or (2) the inlet pressure to the device drops sufficiently due to upstream pressure fluctuations to affect the required operating differential between the inlet pressure and the reduced pressure zone. Otherwise, such relief (spitting) can occur when the second check is fouled during emergency backflow or resulting from a water hammer condition.

*For further details, contact your technical sales representative, see back page.*

### **IMPORTANT**

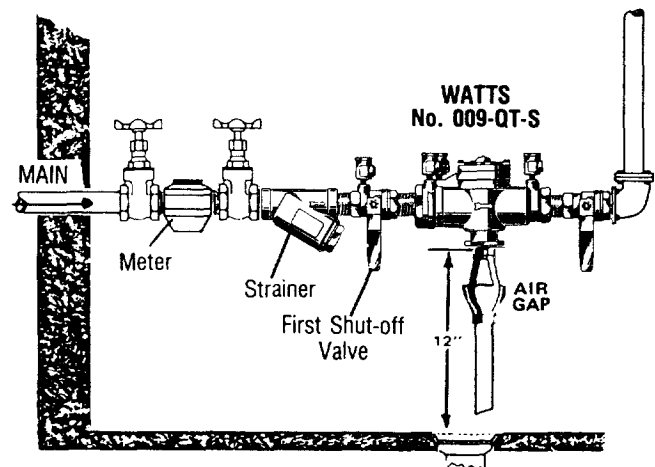
Backflow prevention assemblies **MUST** be installed by a licensed journeyman tradesperson, who is recognized by the authority having jurisdiction, and inspected for compliance with local safety codes. Certified testing and maintenance are required to ensure proper function and maximum effectiveness of assemblies. These services must begin upon installation and be provided at intervals not to exceed one year and as system conditions warrant.



## Installation - Indoors

Figure 1

For indoor installations, it is important that the valve be easily accessible to facilitate testing and servicing. Series 009 may be installed either vertically or horizontally. If installed vertically, flow must be **down**. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap (see ES-AG-909) should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations.



## Installation - Outside Building, Above Ground

Figure 2

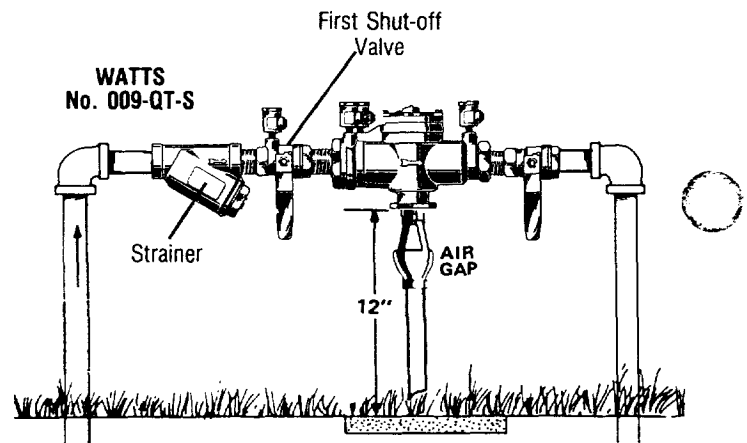
In an area where freezing conditions **do not occur**, Series 009 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

In an area where freezing conditions **can occur**, Series 009 should be installed in a properly insulated utility building or shelter.

Series 009 may be installed in a vertical or horizontal line and in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 009 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.

**Note:** When installed vertically, the direction of flow must be down.



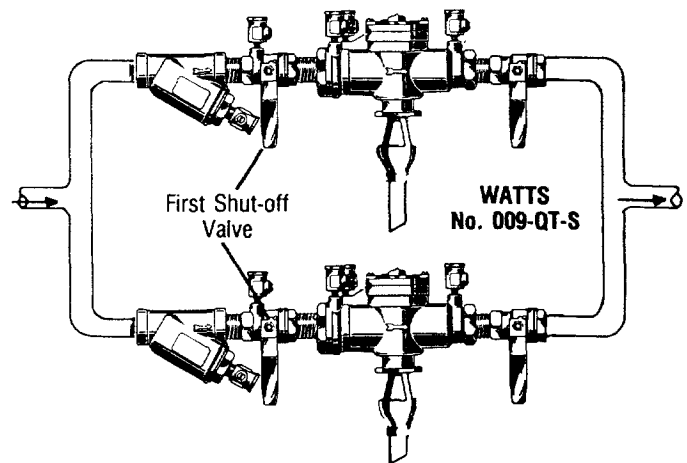
## Installation - Parallel Devices

Figure 3

CONSULT LOCAL  
CODES FOR APPROVAL

Two or more smaller size valves can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

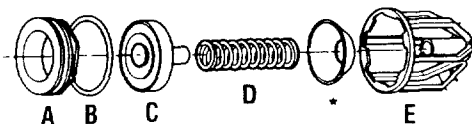
The number of assemblies used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.



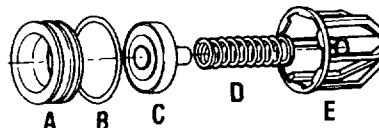
Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

# Servicing First and Second Check Valves 1/2" to 2"

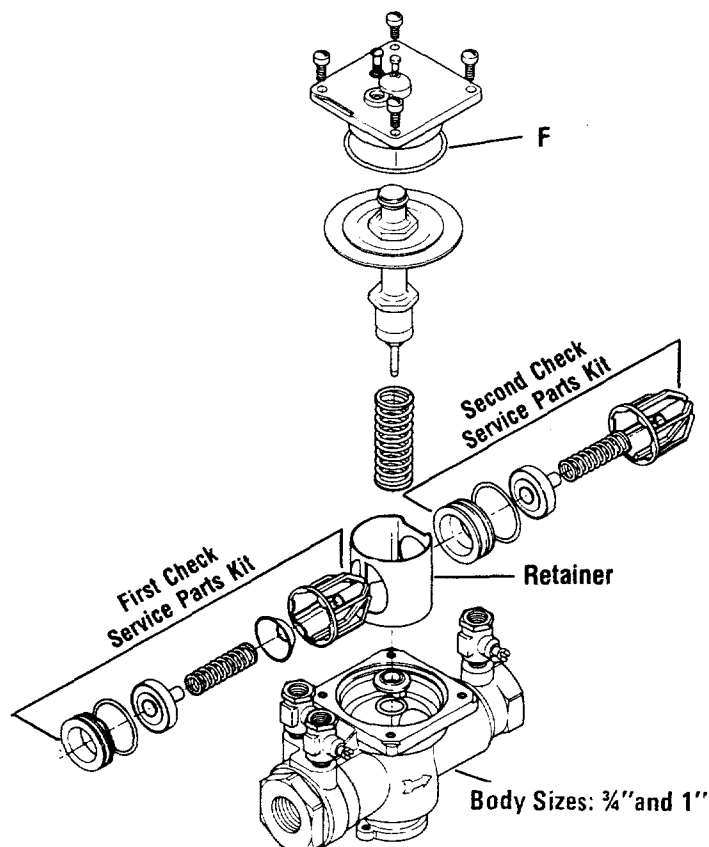
## FIRST CHECK



## SECOND CHECK



1. Remove the relief valve assembly as outlined on page 6.
2. Remove the retainer from the body bore. The check valve modules can now be removed from the valve by hand or with a screwdriver. **Note:** The seats and springs of the first and second check modules are **not** interchangeable. The heavier spring and/or smaller diameter seat belong with the first check module.
3. The check seats are attached to the cage with a bayonet type locking arrangement. Holding the cage in one hand, push the seat inward and rotate counter-clockwise against the cage. The seat, spring cage, spring and disc assembly are now individual components.  
**Note:** 1/2" - 3/4" M2 modules snap apart
4. The disc assembly may now be cleaned and re-assembled or, depending on its condition, may be discarded and replaced with a new assembly from the repair kit. "O" rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease furnished with the service kit.
5. Re-assemble the check valve modules. Check modules are installed in the valve body with the seats facing the valve inlet. The modules must be securely in place before the retainer can be replaced. On the 3/4" and 1" size, this retainer may have to be tilted slightly into place. Replace relief valve assembly.



# Replacement Parts 1/2" - 2"

When ordering, specify Ordering Code Number, Kit Number and Valve Size.

## FIRST CHECK SERVICE PARTS KIT Series 009 (all models) Sizes 1/2" - 2"

### Kit Includes:

- |                   |                     |
|-------------------|---------------------|
| A - Seat          | E - Check Cage      |
| B - Seat "O" Ring | F - Cover "O" Rings |
| C - Disc Assembly | * - Deflector       |
| D - Spring        | — Lubricant         |

Ordering Code No.	Kit No.	Size (In.)
881935	169BFP-RK	1/2"
881936	170BFP-RK	3/4" M2
881608	128BFP-RK	3/4", 1"
881609	129BFP-RK	1 1/4", 1 1/2", 2"

## SECOND CHECK SERVICE PARTS KIT Series 009 (all models) Sizes 1/2" - 2"

### Kit Includes:

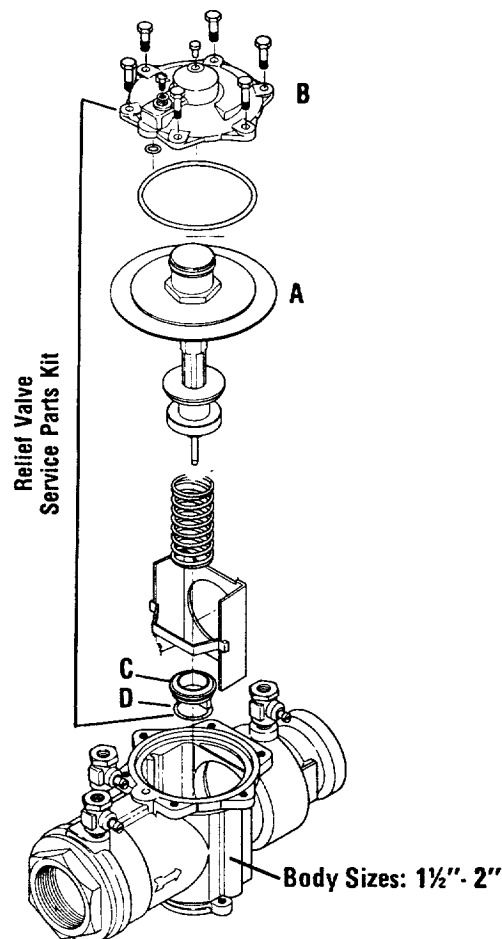
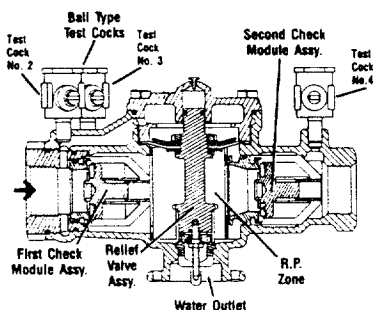
- |                   |                     |
|-------------------|---------------------|
| A - Seat          | E - Check Cage      |
| B - Seat "O" Ring | F - Cover "O" Rings |
| C - Disc Assembly | — Lubricant         |
| D - Spring        |                     |

Ordering Code No.	Kit No.	Size (In.)
881937	171BFP-RK	1/2"
881938	172BFP-RK	3/4" M2
881604	124BFP-RK	3/4", 1"
881605	125BFP-RK	1 1/4", 1 1/2", 2"

# Servicing the Relief Valve 1/2" - 2"

1. Remove the relief valve cover bolts while holding the cover down.
2. Lift the cover straight off. The stem and diaphragm assembly will normally remain with the cover as it is removed. The relief valve spring will be free inside the body at this point.
3. The relief valve seat is located at the bottom of the body bore, and can be removed, if necessary, for cleaning. The disc can be cleaned without disassembly of the relief valve module. If it is determined that the relief valve diaphragm and/or disc should be replaced, the relief valve module can be readily disassembled without the use of special tools. **Note:** The disc rubber is molded into the disc holder and is supplied as a disc holder assembly.
4. To re-assemble the relief valve, press the seat firmly into place in the body, center the spring on the seat, and insert the cover and relief valve module as a unit straight into the bore. Press down on the cover to assure proper alignment. Insert and tighten bolts.

**Caution:** If cover will not press flat against body, stem assembly is crooked and damage can result. Re-align stem and cover before bolts are inserted.



## Replacement Parts 1/2" to 2"

When ordering, specify Ordering Code Number, Kit Number and Valve Size.

### RELIEF VALVE SERVICE PARTS KIT

Series 009 (all models) Sizes 1/2" - 2"

#### Kit Includes:

- A - Relief Valve Assembly
- B - Cover Assembly
- C - Seat
- D - Seat "O" Ring
- Lubricant

Ordering Code No.	Kit No.	Size (In.)
881939	173BFP-RK	1/2"
881940	174BFP-RK	3/4" M2
881621	141BFP-RK	3/4", 1"
881622	142BFP-RK	1 1/4", 1 1/2", 2"

### COMPLETE VALVE RUBBER PARTS KIT

Series 009 (all models) Sizes 1/2" - 2"

#### Kit Includes:

"O" Rings, Check Discs, Diaphragm and Lubricant.

For Rubber Parts Kit and other Repair Kits, send for RP-BFP.

Ordering Code No.	Kit No.	Size (In.)
881941	175BFP-RK	1/2"
881942	176BFP-RK	3/4" M2
881625	145BFP-RK	3/4", 1"
881626	146BFP-RK	1 1/4", 1 1/2", 2"

# TROUBLE SHOOTING GUIDE

## Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
A.1	Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device. (Watts ¾"-2" No. 601 bronze valve.)
A.2	Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve. (Watts ¾"-2" No. 601 bronze valve.)
<b>B. Valve drips continually from the vent.</b>			
B.1	Fouled first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
B.2	Damaged or fouled relief valve seat.	No	B.2 Clean or replace the relief valve seat.
B.3	Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.
B.4	Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
B.5	Electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
B.6	Deterioration of checks due to high temp. water usage.	No	B.6 Replace plastic checks with stainless steel checks or replace complete unit with No. 909HW.
<b>C. Valve exhibits high pressure drop.</b>			
C.1	Fouled strainer.	No	C.1 Clean strainer element or replace.
C.2	Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.
<b>D. No water flows downstream of valve.</b>			
D.	Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.
<b>E. Valve does not test properly.</b>			
E.1	Follow test procedure prescribed by USC foundation manual section 9.	No	E.1, E.2 Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves.
E.2	Leaky downstream gate valve.	No	
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
F.	Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.
<b>G. Water spillage on floor.</b>			
G.	Transposed checks 2½"-10" valves	No	G. If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, first check, relief valve, second check, second shut-off valve.
<b>H. Winterization of backflow preventers.</b>			
			H. Electric heat-tape wrap closely together around valve body.  Build a small shelter around the valve with a large light bulb installed and left on at all times.  If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.

# For Technical Assistance Call Your Authorized Watts Agent

		Telephone #	Fax #
Bruce Parrott, N.E. Reg. Mgr.	815 Chestnut St., North Andover, MA 01845	508 688-1811	508 794-1848
Trayco Sales, Inc.	P.O. Box 653, Lynnfield, MA 01940	617 334-6078	617 334-2859
W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-83
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691	203 873-8
WMS Sales, Inc.	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 632-063
WMS Sales, Inc.	7437 Meadowbrook Dr., Baldwinsville, NY 13027	315 622-0763	315 622-0764
WMS Sales, Inc.	4 McMillen Place, Delmar, NY 12054	518 475-1017	
Edwards, Platt & Deely, Inc.	1 Stone Place, Bronxville, NY 10708	Office: 212 671-6400	914 337-5069
	(Warehouse: 263 Royal Ave., Hawthorne, NJ 07506)	800 433-3158	
		Warehouse: N.Y. 914 337-5511	
J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	412 745-5300	412 745-7420
Vernon Bitzer Associates, Inc.	138 Railroad Dr., Northampton Ind. Pk., Ivyland, PA 18974	215 953-1400	215 953-1250
Bill Johnson, S.E. Reg. Director	P.O. Box 140153, Orlando, FL 32814-0153	407 895-3461	407 895-3462
RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
Smith & Stevenson	4935 Chastain Ave., Charlotte, NC 28210	704 525-3388	704 525-6749
Central Sales Company	1612 Fourth Ave. North, Nashville, TN 37208	615 259-9022	615 259-9024
Central Sales Company	2170 York Ave., Memphis, TN 38104	901 278-2251	901 272-1614
Spotswood Associates	6700 Best Friend Rd., Norcross, (Atlanta) GA 30071-2919	404 447-1227	404 263-6899
Distributor Sales of Florida	6520 35th St. North, Pinellas Park, FL 33565	813 527-6651	813 528-0602
Earl L. Griffin Co.	2776 B.M. Montgomery St., Birmingham, AL 35209	205 879-3469	205 870-5027
Earl L. Griffin Co.	6517 Buggy Whip Court, Mobile, AL 36695	205 661-1199	
Billingsley & Associates, Inc.	5609-D Salmen St., Harahan, LA 70123	504 733-7624	504 733-6904
Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
JLM & Associates, Inc.	1147 Americo Miranda, Caparra Terrace, Rio Piedras, PR 09922	809 782-4244	809 781-7970
The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
Hugh M. Cunningham, Inc.	4309 N. Beltwood Pkwy., Dallas, TX 75244-3294	214 661-0222	214 490-6678
Hugh M. Cunningham, Inc.	1999 Kofahl, Houston, TX 77023	713 923-2371	713 923-8357
Hugh M. Cunningham, Inc.	5130 Service Center, San Antonio, TX 78218	512 661-4161	512 661-0954
Don Sinsabaugh, MidWest Reg. Sales Mgr.	42 W. 597 Steeple Chase, St. Charles, IL 60175	708 377-3671	708 513-5063
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	708 953-1211	708 953-1067
Mid-Continent Marketing Services Ltd.	10109 Apple Spice Dr., Indianapolis, IN 46236	317 823-1532	317 823-1663
Advance Industrial Marketing Ltd.	923 South Bird St., Sun Prairie, WI 53590	608 837-5005	608 837-2368
Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
The Harris-Billings Co.	P.O. Box 41304, 1920 Annapolis Lane North, Plymouth, MN 55441	612 559-9400	612 559-8239
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-50
Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-951
Mack McClain & Associates, Inc.	16037 "N" Circle, Omaha, NE 68135	402 896-8804	402 896-8807
Pro-Spec, Inc.	P.O. Box 472226, Tulsa, OK 74145	918 664-5642	918 664-6069
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, MO 63143	314 644-5454	314 644-5527
Disney-McLane, Inc.	2704 Colerain Ave., Cincinnati, OH 45225	513 541-1682	513 541-0073
Madsen-Bayer & Associates, Inc.	2510 Englewood Dr., Columbus, OH 43219	614 476-1833	614 476-1846
Madsen-Bayer & Associates, Inc.	4640 Warner Rd., Garfield Heights, OH 44125	216 641-5808	216 641-5546
Gary S. Gilpin Sales Co.	4468 Emberson Ave., Louisville, KY 40209	502 367-2178	502 367-9080
Jim Engard, West Reg. Sales Mgr.	749 Renate Way, Paso Robles, CA 93446	805 239-8852	805 239-8859
Steve Governo, Market Mgr. Backflow	276 Ginger Lane, Paso Robles, CA 93446	805 237-2413	805 237-2265
R. C. Hartnett & Associates	30852 Huntwood Ave., Hayward, CA 94544	415 471-7200	415 471-4441
Hollabaugh Brothers & Associates	1260 6th Ave. South, Seattle, WA 98134-1308	206 467-0346	206 467-8368
Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
R. E. Fitzpatrick Sales, Inc.	16 East 8th Ave., Midvale, UT 84047	801 566-7156	801 566-4979
Fanning & Associates, Inc.	625 East 70th Ave., Denver, CO 80229	303 289-4191	303 286-9069
Benisek Associates	2267 Yates Ave., Los Angeles, CA 90040	213 685-9900	213 887-2090
R. D. Wager Company	2012 West 4th St., Tempe, AZ 85281	602 968-8586	602 829-7682
Rocky Mountain Marketing	3300 Princeton N.E., N-27, Albuquerque, NM 87107	505 883-4405	505 881-3767
Crown Sales	360 Mokauea St., Honolulu, HI 96819	808 845-7881	808 841-4504
HDQTRS: Watts Regulator Co./EXPORT	815 Chestnut St., North Andover, MA 01845 Telex: 94-7460	508 688-1811	508 794-1848
			508 794-1674
Watts Regulator of Canada Ltd.	441 Hanlan Rd., Woodbridge, Ontario L4L3T1, Canada	416 851-8591	416 851-8788
Walmar	24 Gurdwara Rd., Nepean, Ontario K2E 8A2	613 225-9774	613 225-2972
Currie Agencies Ltd.	3117 Underhill Ave., Burnaby, B.C. V5A 3C8	604 420-6070	604 420-9022
Polymex Controles Inc.	1375 Boul Charest Ouest, Suite 6, Quebec City, Quebec G1N 2E7	418 682-1690	418 682-8743
Watts Regulator of Canada Ltd.	2690 Sabourin, Ville St. Laurent, Quebec H4S 1M2	514 337-9010	514 337-8843
Murray Krovats Sales Agency	941 Cerin St., Winnipeg, Manitoba R3B 2W6	709 786-2747	709 775-3186
Bayers-Conte Sales Ltd.	1801 10th Ave., Southwest, Calgary, Alberta T3C 0K2	403 244-1818	403 245-9297
W.B. Gingerich Sales Ltd.	107 Hamilton Rd., New Hamburg, Ontario N0B 2G0	519 662-2460	519 662-2491
S.T.E. Fetterly & Son Ltd.	6080 Young St., Suite 911, Halifax, NS B3K 5L8	902 454-9377	902 454-6085
Watts Regulator of Nederland b.v.	P.O. Box 98, 6960 AB Eerbeek, Holland Telex: 844-35365	(011) 31-8-338-59028	8-338-52073

World Class Valves



**Backflow  
Prevention  
Division**

RP/IS-009S 919

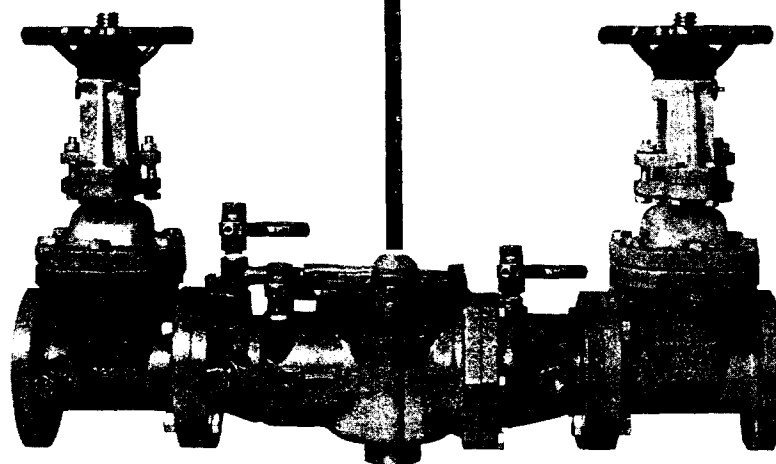
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BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

Sizes: 2½" and 3"

# Series 009

## REDUCED PRESSURE ZONE BACKFLOW PREVENTERS



### BACKFLOW PREVENTION

- CONTAINMENT • CROSS CONNECTION CONTROL

No. 009 supplied with NRS resilient wedge gate valve shutoffs.

**Options: Suffix**

- S - with strainer, FDA approved epoxy coating.
- OSY-RW - with OS&Y resilient wedge gate valve shutoffs.
- QT - with quarter-turn, full port, resilient seated, ball valve shutoffs.
- QT-FDA - for FDA epoxy coated, quarter turn, full port, resilient seated ball valve shutoffs.
- LF - without shutoff valves.

### INSTALLATION SERVICE REPLACEMENT PARTS and MAINTENANCE

For field testing procedure, send for S-FT-TK-9A, IS- TK-DP and IS-TK-DR.

For other repair kits and service parts, send for RP-BFP.

World Class Valves



**HDQTRS:** 815 Chestnut St., N. Andover, MA 01845  
**MAIL:** Box 628, Lawrence, MA 01842 **Telex:** 94-7460  
**Tel.** (508) 688-1811 **Fax:** (508) 794-1848/794-1674  
**International Subsidiaries:** Watts Regulator of Canada Ltd.  
**Tel.** (416) 851 8591 **Fax:** (416) 851 8788  
**Watts Regulator (Nederland)b.v.** **Telex:** 844 35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY

# INSTALLATION INSTRUCTIONS

## Series 009 - Sizes 2½" and 3"

**A.** Series 009 may be installed in a vertical or horizontal position. \* When installed vertically, the direction of flow must be **down**. This positions the relief valve below the first check valve enabling the zone to drain through the relief valve outlet.

**Note: Shutoff Valves:** When shutoff valves are removed and reassembly is necessary, the shutoff valve with the test cock is to be mounted on the inlet side of the backflow preventer.

**B.** The 009 should always be installed in an accessible location to facilitate testing and servicing (See figure 2 thru 4 on page 6). **Check the state and local codes to insure that the backflow preventer is installed in compliance, such as the proper height above the ground.**

**C.** We recommend a strainer be installed (fig. 2 on page 6) ahead of No. 009 series assemblies to protect the internal components from unnecessary fouling.

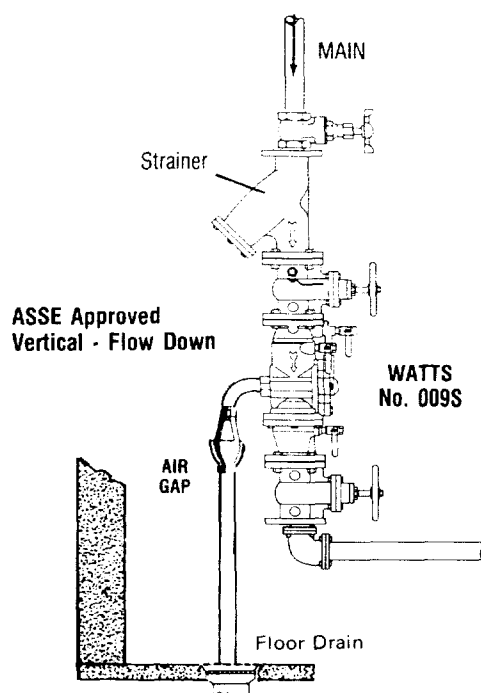
**Caution:** Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon only during emergencies, such as fire sprinkler lines.

**Start Up:** The downstream shut-off should be closed. Open upstream slowly and fill valve. When valve is filled, open the downstream shut-off slowly and fill the water supply system. This is necessary to avoid water hammer or shock damage.

**D.** Water discharge from the relief valve should be vented in accordance with code requirements. The relief valve should never be solidly piped into a drainage ditch, sewer or sump. The discharge should be terminated approximately 12" above the ground or through an air gap piped to a floor drain.

### **NOTE: Relief Valve Discharge Rates**

The installation of an air gap with the drain line terminating above a floor drain will handle any normal discharge or nuisance spitting through the relief valve. However, floor drain size may need to be designed to prevent water damage caused by a catastrophic failure condition. Please refer to Figure No. 1 for maximum relief valve discharge rates, size and capacity of typical floor drains.



**\* IMPORTANT: Inquire with governing authorities for local installation requirements.**

**NOTE: Do not** reduce the size of the drain line from the air gap fitting. Pipe full line size.

**E.** After initial installation, a discharge from the relief valve opening may occur until all seating surfaces have become seated or due to inadequate initial flushing of pipe lines to eliminate dirt and pipe compounds. If flushing will not clear, remove the first check valve and clean thoroughly.

**NOTE:** Periodic relief valve discharge may occur on dead end service applications, such as boiler feed lines or cooling tower make-up lines due to fluctuating supply pressure during a static or no flow condition. To avoid this discharge, install a check valve ahead of the backflow assembly to "lock-in" the downstream pressure.

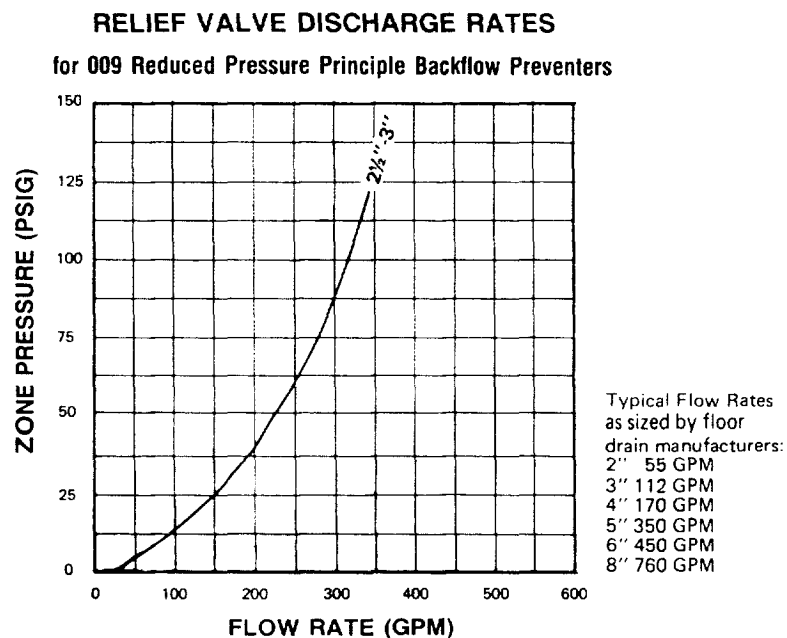
**F.** Backflow preventers should never be placed in pits unless absolutely necessary and then only when and as approved by local codes. In such cases, provision should be made to always vent above flood level or for a pit drain to insure an adequate air gap below the relief port. Consult your local or state jurisdictional authorities.

**G.** It is important that Series 009 backflow preventers be inspected periodically for any discharge from the relief valve which will provide a visual indication of need for cleaning or repair of check valves. Also testing for proper operation of the device should be made periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions. Send for S-FT-TK9A, IS -TK-DP and IS-TK-DR instruction manual for test procedures.

**NOTE: Special considerations are necessary when testing assemblies installed on Fire Prevention Systems.**

**Fire Protection System Installations:** The National Fire protection Agency (NFPA) Guidelines require a confirming flow test be conducted whenever a "main line" valve such as the shut-off valves or a backflow assembly have been operated. Certified testers of backflow assemblies must conduct this confirming test.

**IMPORTANT: Inquire with governing authorities for local installation requirements.**



**Figure No. 1**

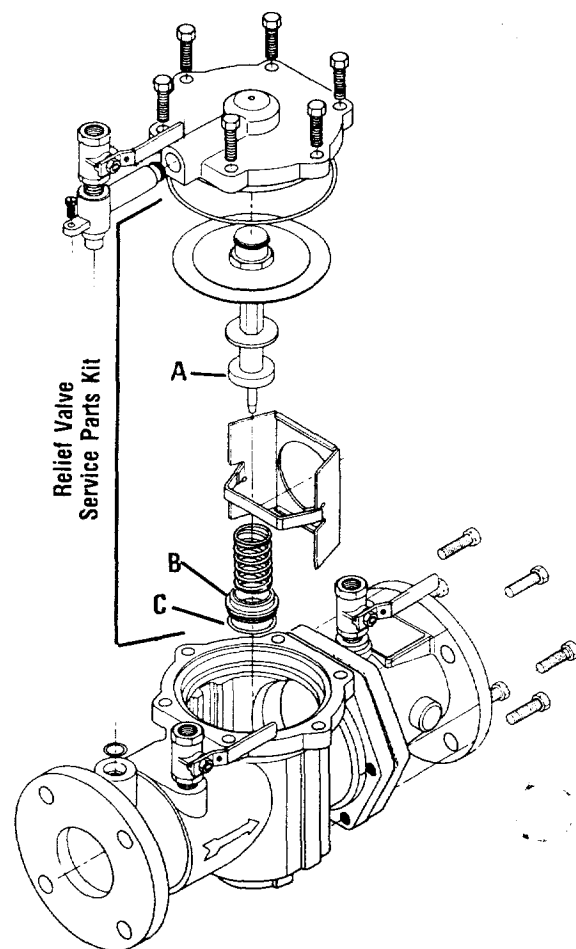
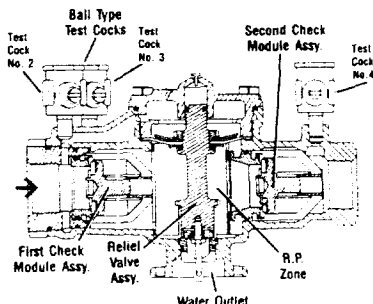


# Servicing the Relief Valve 2½"- 3"

1. Remove the four or six relief valve cover bolts while holding the cover down.
2. Lift the cover straight off. The stem and diaphragm assembly will normally remain with the cover as it is removed. The relief valve spring will be free inside the body at this point.
3. The relief valve seat is located at the bottom of the body bore, and can be removed, if necessary, for cleaning. The disc can be cleaned without disassembly of the relief valve module. If it is determined that the relief valve diaphragm and/or disc should be replaced, the relief valve module can be readily disassembled without the use of special tools. **Note:** The disc rubber is molded into the disc holder and is supplied as a disc holder assembly.
4. To re-assemble the relief valve, press the seat firmly into place in the body, center the spring on the seat, and insert the cover and relief valve module as a unit straight into the bore. Press down on the cover to assure proper alignment. Insert and tighten bolts.

**Caution:** If cover will not press flat against body, stem assembly is crooked and damage can result. Re-align stem and cover before bolts are inserted.

**NOTE:** No special tools required to service Series 009 ½"- 3".



## Replacement Parts 2½"- 3"

When ordering, specify Ordering Code Number, Kit Number and Valve Size.

### RELIEF VALVE SERVICE PARTS KIT

Series 009 (all models) Sizes 2½"- 3"

**Kit Includes:**

- |                        |                         |
|------------------------|-------------------------|
| A - Relief Valve Assy. | • - Cover "O" Ring      |
| B - Seat               | • - Flow Tube "O" Rings |
| C - Seat "O" Ring      | • - Lubricant           |

Ordering Code No.	Kit No.	Size (In.)
881930	160BFP-RK	2½"- 3"

### COMPLETE VALVE RUBBER PARTS KIT

Series 009 (all models) Sizes 2½"- 3"

**Kit Includes:**

"O" Rings, Check Discs, Relief Valve Disc, Diaphragm and Lubricant

Ordering Code No.	Kit No.	Size (In.)
881931	161BFP-RK	2½"- 3"

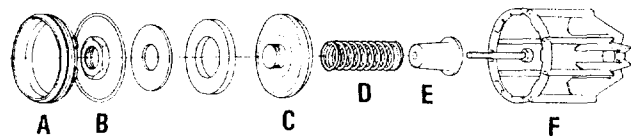
For other Repair Kits, send for RP-BFP.

# Servicing First and Second Check Valves 2½"- 3"

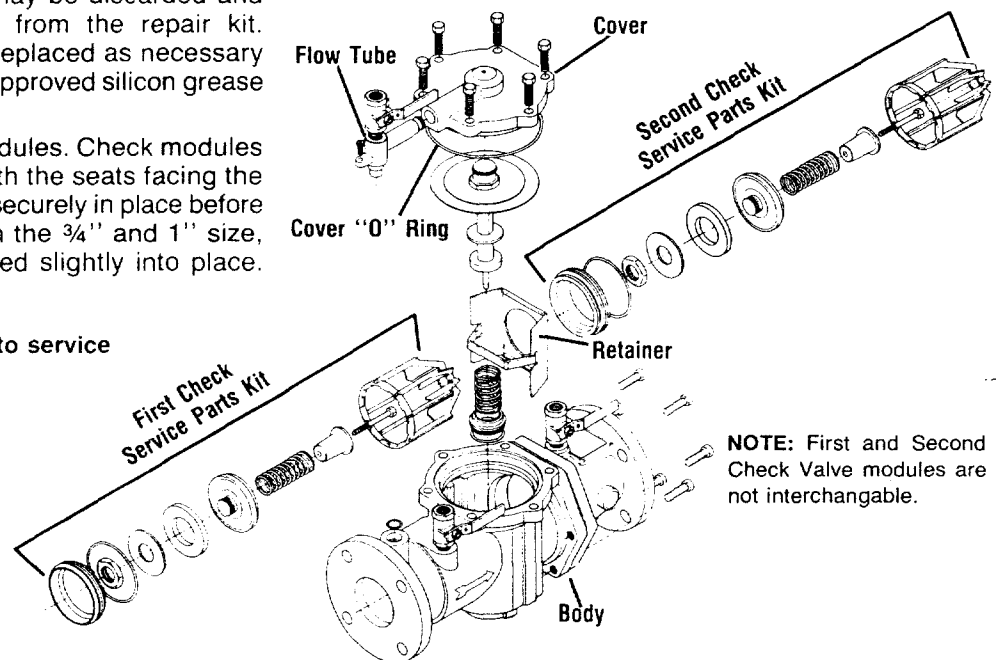
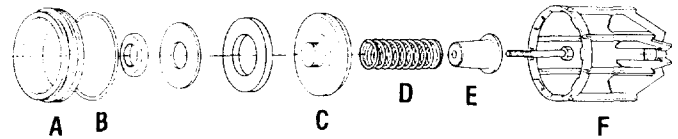
1. Remove the relief valve assembly as outlined on page 4.
2. Remove the retainer from the body bore. The check valve modules can now be removed from the valve by hand or with a screwdriver. **Note:** The seats and springs of the first and second check modules are **not** interchangeable. The heavier spring and smaller diameter seat belong with the first check module.
3. The check seats are attached to the cage with a bayonet type locking arrangement. Holding the cage in one hand, push the seat inward and rotate counter-clockwise against the cage. The seat, spring cage, spring and disc assembly are now individual components.
4. The disc assembly may now be cleaned and re-assembled or, depending on its condition, may be discarded and replaced with a new assembly from the repair kit. "O" rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease furnished with the service kit.
5. Re-assemble the check valve modules. Check modules are installed in the valve body with the seats facing the valve inlet. The modules must be securely in place before the retainer can be replaced. On the ¾" and 1" size, this retainer may have to be tilted slightly into place. Replace relief valve assembly.

**NOTE:** No special tools required to service Series 009 ½"- 3".

## FIRST CHECK



## SECOND CHECK



# Replacement Parts 2½"- 3"

When ordering, specify Ordering Code Number, Kit Number and Valve Size.

## FIRST CHECK SERVICE PARTS KIT

Series 009 (all models) Sizes 2½"- 3"

Kit Includes:

- |                   |                     |
|-------------------|---------------------|
| A - Seat          | E - Spring Retainer |
| B - Seat "O" Ring | F - Check Cage      |
| C - Disc Assembly | • - Cover "O" Ring  |
| D - Spring        | • - Lubricant       |

Ordering Code No.	Kit No.	Size (In.)
881928	158BFP-RK	2½"- 3"

## SECOND CHECK SERVICE PARTS KIT

Series 009 (all models) Sizes 2½"- 3"

Kit Includes:

- |                   |                     |
|-------------------|---------------------|
| A - Seat          | E - Spring Retainer |
| B - Seat "O" Ring | F - Check Cage      |
| C - Disc Assembly | • - Cover "O" Ring  |
| D - Spring        | • - Lubricant       |

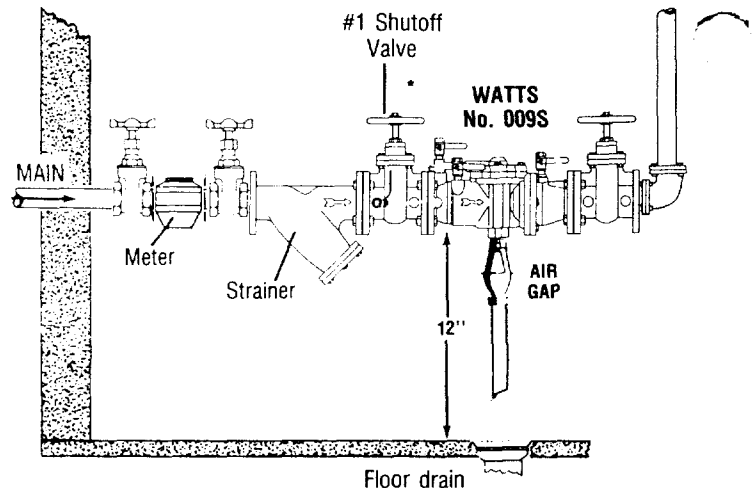
Ordering Code No.	Kit No.	Size (In.)
881929	159BFP-RK	2½"- 3"

## Installation - Indoors

Figure 2

For indoor installations, it is important that the assembly be easily accessible to facilitate testing and servicing. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap (see ES-AG-909) should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations.

\*Note: For non-strainer models, test cock must be located on the first or inlet shut-off valve.



## Installation - Outside Building, Above Ground

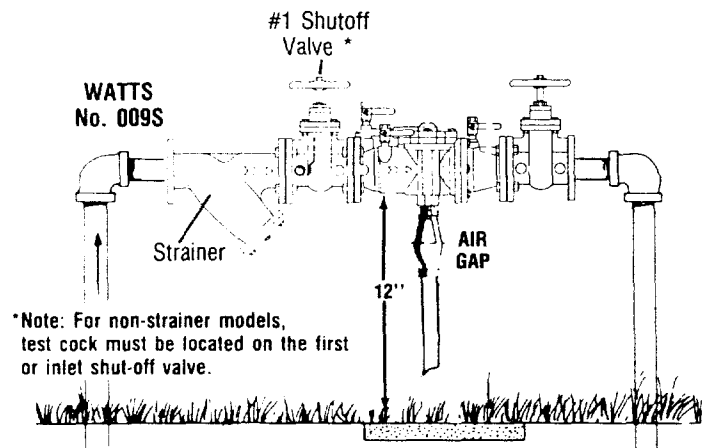
Figure 3

In an area where freezing conditions **do not occur**, Series 009 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

In an area where freezing conditions **can occur**, Series 009 should be installed in a properly insulated utility building or shelter.

Series 009 must be installed in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 009 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



\*Note: For non-strainer models, test cock must be located on the first or inlet shut-off valve.

## Installation - Parallel Devices

Figure 4

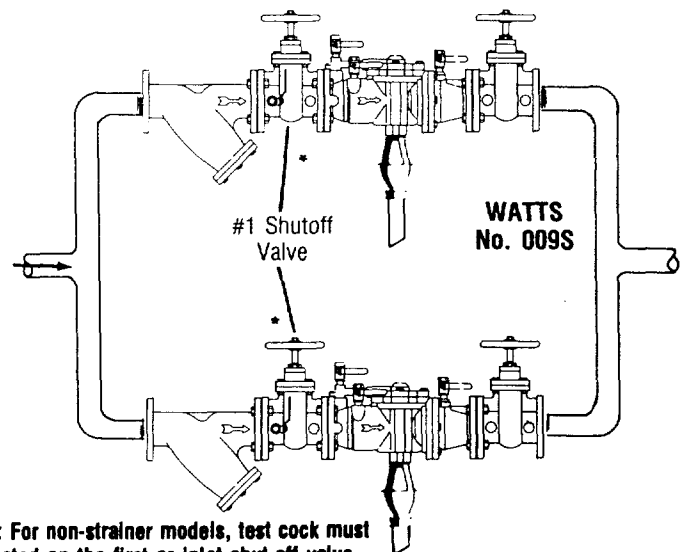
CONSULT LOCAL  
CODES FOR APPROVAL

Two or more smaller size assemblies can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

The number of assemblies used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.

For parallel valve installations, the total capacity of the assemblies should equal or exceed that required by the system.

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.



\*Note: For non-strainer models, test cock must be located on the first or inlet shut-off valve.

# TROUBLE SHOOTING GUIDE

## Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
	A.1 Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device.
	A.2 Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve.
<b>B. Valve drips continually from the vent.</b>			
	B.1 Fouled or damaged first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check or check components.
	B.2 Fouled or damaged relief valve seat.	No	B.2 Clean or replace the relief valve seat.
	B.3 Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.
	B.4 Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
	B.5 Dezincification caused by electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
<b>C. Valve exhibits high pressure drop.</b>			
	C.1 Fouled strainer.	No	C.1 Clean strainer element or replace.
	C.2 Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.
<b>D. No water flows downstream of valve</b>			
	D. Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.
<b>E. Valve does not test properly</b>			
	E. Leaky downstream gate valve.	No	E. Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves. Follow test procedure prescribed by USC foundation manual section 9.
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
	F. Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.
<b>G. Water spillage on floor.</b>			
	G.1 Fouled first check or pressure fluctuation.	No	G.1 See A.1, A.2, B.1-6
	G.2 Transposed checks 2½"- 10" valves.	No	G.2 If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, first check, relief valve, second check, second shut-off valve.
<b>H. Winterization of backflow preventers.</b>			
			H. Electric heat-tape wrap closely together around valve body.  Build a small shelter around the valve with a large light bulb installed and left on at all times.  If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.

# For Technical Assistance Call Your Authorized Watts Agent

		Telephone #	Fax #
Bruce Parrott, N.E. Reg. Mgr.	815 Chestnut St., North Andover, MA 01845	508 688-1811	508 794-1848
Trayco Sales, Inc.	P.O. Box 653, Lynnfield, MA 01940	617 334-6078	617 334-2859
W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691	203 873-8693
WMS Sales, Inc.	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
WMS Sales, Inc.	7437 Meadowbrook Dr., Baldwinsville, NY 13027	315 622-0763	315 622-0764
WMS Sales, Inc.	4 McMillen Place, Delmar, NY 12054	518 475-1017	
Edwards, Platt & Deely, Inc.	931A Conklin St., Farmingdale, NY 11735	516 777-3800	516 777-3810
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Vernon Bitzer Associates, Inc.	138 Railroad Dr., Northampton Ind. Pk., Ivyland, PA 18974	215 953-1400	215 953-1250
Bill Johnson, S.E. Reg. Director	P.O. Box 140153 Orlando, FL 32814-0153	407 895-3461	407 895-3462
RMI	Glenfield Bus Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
Smith & Stevenson	4935 Chastain Ave., Charlotte, NC 28210	704 525-3388	704 525-6749
Central Sales Company	1612 Fourth Ave. North, Nashville, TN 37208	615 259-9022	615 259-9024
Central Sales Company	2170 York Ave., Memphis, TN 38104	901 278-2251	901 272-1614
Spotswood Associates	6700 Best Friend Rd., Norcross, (Atlanta) GA 30071-2919	404 447-1227	404 263-6899
Distributor Sales of Florida	6520 35th St. North, Pinellas Park, FL 33565	813 527-6651	813 528-0602
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Earl L. Griffin Co.	6517 Buggy Whip Court, Mobile, AL 36695	205 661-1199	
Billingsley & Associates, Inc.	5609-D Salmen St., Harahan, LA 70123	504 733-7624	504 733-6904
Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
JLM & Associates, Inc.	1147 Americo Miranda, Caparra Terrace, Rio Piedras, PR 09922	809 782-4244	809 781-7970
The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
Hugh M. Cunningham, Inc.	4309 N. Beltwood Pkwy., Dallas, TX 75244-3294	214 661-0222	214 490-6678
Hugh M. Cunningham, Inc.	1999 Kofahl, Houston, TX 77023	713 923-2371	713 923-8357
Hugh M. Cunningham, Inc.	5130 Service Center, San Antonio, TX 78218	512 661-4161	512 661-0954
Don Sinsabaugh, MidWest Reg. Sales Mgr.	42 W. 597 Steeple Chase, St. Charles, IL 60175	708 377-3671	708 513-5063
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	708 953-1211	708 953-1067
Mid-Continent Marketing Services Ltd.	5508 Elmwood Ave., Suite 401, Indianapolis, IN 46203	317 782-1515	317 782-4360
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The Harris-Billings Co.	P.O. Box 41304, 1920 Annapolis Lane North, Plymouth, MN 55441	612 559-9400	612 559-8239
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-5049
Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
Mack McClain & Associates, Inc.	16037 "N" Circle, Omaha, NE 68135	402 896-8804	402 896-8807
Pro-Spec, Inc.	P.O. Box 472226, Tulsa, OK 74145	918 664-5642	918 664-6069
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, MO 63143	314 644-5454	314 644-5527
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Madsen-Bayer & Associates, Inc.	2510 Englewood Dr., Columbus, OH 43219	614 476-1833	614 476-1846
Madsen-Bayer & Associates, Inc.	4640 Warner Rd., Garfield Heights, OH 44125	216 641-5808	216 641-5546
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Jim Engard, West Reg. Sales Mgr.	749 Renate Way, Paso Robles, CA 93446	805 239-8852	805 239-8859
Steve Govero, Market Mgr. Backflow	276 Ginger Lane, Paso Robles, CA 93446	805 237-2413	805 237-2265
R. C. Hartnett & Associates	30852 Huntwood Ave., Hayward, CA 94544	415 471-7200	415 471-4441
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Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
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Fanning & Associates, Inc.	625 East 70th Ave., Denver, CO 80229	303 289-4191	303 286-9069
Benisek Associates	2267 Yates Ave., Los Angeles, CA 90040	213 685-9900	213 887-2090
Plumbing/Industrial Representatives	2012 West 4th St., Tempe, AZ 85281	602 968-8586	602 829-7682
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Crown Sales	360 Mokauea St., Honolulu, HI 96819	808 845-7881	808 841-4504
HDQTRS: Watts Regulator Co./EXPORT	815 Chestnut St., North Andover, MA 01845 <b>Telex: 94-7460</b>	508 688-1811	508 794-1848
Watts Regulator of Canada Ltd.	441 Hanlan Rd., Woodbridge, Ontario L4L 3T1, Canada	416 851-8591	416 851-8788
Walmar	24 Gurdwara Rd., Nepean, Ontario K2E 8A2	613 225-9774	613 225-0673
Currie Agencies Ltd.	3117 Underhill Ave., Burnaby, British Columbia V5A 3C8	604 420-6070	604 420-9022
Polymex Controles Inc.	1375 Boul Charest Ouest, Suite 6, Quebec City, Quebec G1N 2E7	418 682-1690	418 682-8743
Watts Regulator of Canada Ltd.	2690 Sabourin, Ville St. Laurent, Quebec H4S 1M2	514 337-9010	514 337-8843
Krovats/Gregg Associates	941-C Erin St., Winnipeg, Manitoba R3G 2W6	204 786-2747	204 775-3186
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W.B. Gingerich Sales Ltd.	107 Hamilton Rd., New Hamburg, Ontario NOB 2G0	519 662-2460	519 662-2491
Fetterly & Associates	6080 Young St., Suite 911, Halifax, Nova Scotia B3K 5L8	902 454-9377	902 454-6085
Watts Regulator of Nederland b.v.	P.O. Box 98, 6960 AB Eerbeek, Holland <b>Telex: 844-35365</b>	(011) 31-8-338-59028	8-338-52073

World Class Valves



**Backflow  
Prevention  
Division**

RP/IS-009L-2 923

Printed in U.S.A.

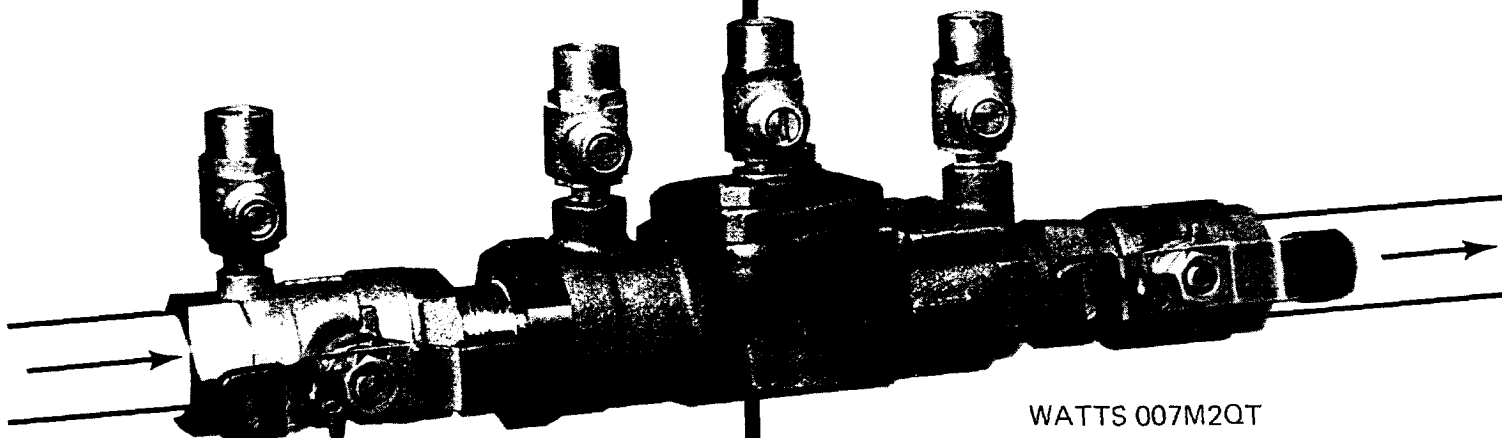
**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**

BACKFLOW PREVENTION  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

# Series 007

## DOUBLE CHECK VALVE BACKFLOW PREVENTERS

Sizes: 1/2" - 2"



WATTS 007M2QT  
Sizes: 3/4"

### • BACKFLOW PREVENTION • CONTAINMENT • CROSS CONNECTION CONTROL

Series 007QT supplied with full port, resilient seated bronze ball valve shutoffs.

Sizes: 1/2", 3/4", 1" have "T" handle ball valve shutoffs.

#### Options: Suffix

S - with bronze strainer

LF - without shutoff valves

Prefix U - For union connections

### INSTALLATION SERVICE REPLACEMENT PARTS and MAINTENANCE

For field testing procedure, send for IS-TK-DP, IS-TK-DR and S-FT-TK-9A.

For trouble shooting guide, refer to S-TSG.

For other repair kits and service parts, send for RP-BFP. For additional information, see master parts distributors on back page.

**IMPORTANT: Inquire with governing authorities for local installation requirements.**

World Class Valves



Since 1874  
HQ/RS: 815 Chestnut St., North Andover, MA 01845 USA  
MAIL: Box 628, Lawrence, MA 01842 Tel: (508) 688-1811  
Watts Industries (Canada) Ltd. Tel: (416) 851-8591  
Watts Regulator (Nederland) b.v. Tel: (416) 851-8788  
Fax: (508) 794-1848 Fax: (416) 851-8788  
Telex: 844-35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

# Installation Instructions,

## WATTS Series 007 Double Check Valve

Check local codes for installation requirements. Pipe lines should be thoroughly flushed to remove foreign material before installing the unit. A strainer should be installed as shown, ahead of backflow preventer to prevent disc from unnecessary fouling. Install valve in the line with arrow on valve body pointing in the direction of flow.

For indoor installations, it is important that the valve be easily accessible to facilitate testing and servicing. Do not install in a concealed location.

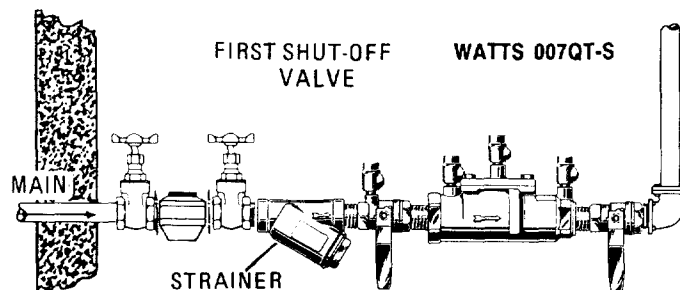
**CAUTION:** Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon during emergencies, such as fire sprinkler lines, etc.

It is important that Series 007 be tested periodically in compliance with local codes, but at least once a year or more often depending upon system conditions. Regular inspection, testing and cleaning assures maximum life and proper product function.

### NOTE: Fire Protection System Installations:

The National Fire Protection Agency (NFPA) Guidelines require a confirming flow test to be conducted whenever a "main line" valve such as the shut-off valves or a backflow assembly have been operated. Certified testers of backflow assemblies must conduct this test. The trim valves of the detector meter bypass line on assemblies so equipped shut-off during the confirming flow test. When the test is completed the trim valves must be returned to a fully open position.

## Installation - Indoors, Figure 1

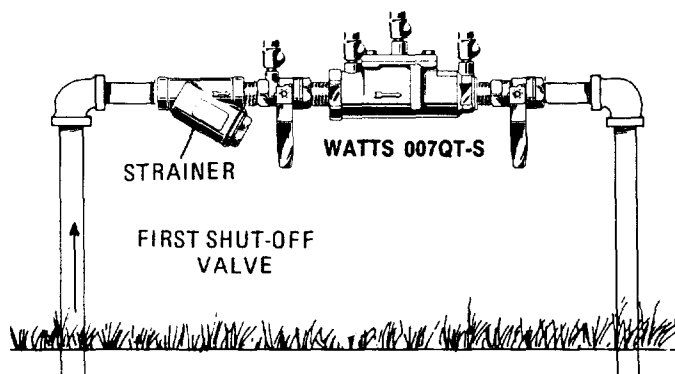
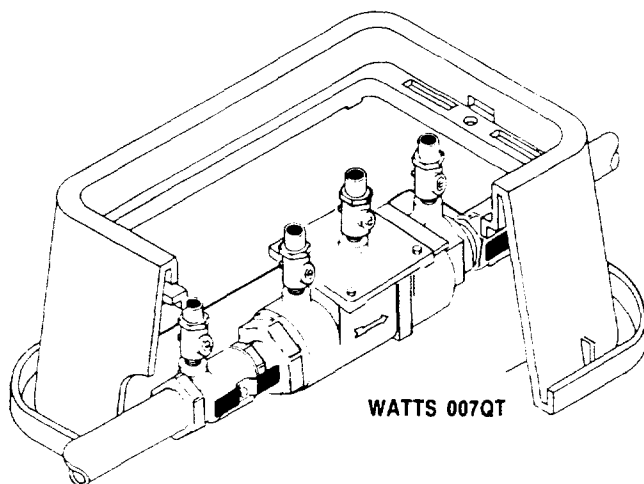


\*NOTE: For non-strainer models, test cock is located on the first shut-off valve.

## Installation - Outside

Figure 2

CONSULT LOCAL  
CODES FOR APPROVAL



## Installation - Parallel

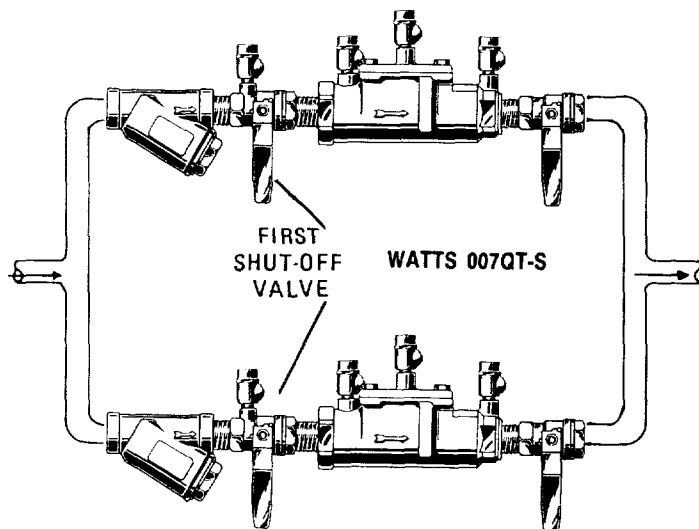
Figure 3

CONSULT LOCAL  
CODES FOR APPROVAL

Two or more Series 007 smaller size valves may be piped in parallel (where approved) to serve a larger supply pipe main. This type of installation is employed whenever it is vital to maintain a continuous supply of water/where interruptions for testing and servicing would be unacceptable. It also has the advantage of providing increased capacity where needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

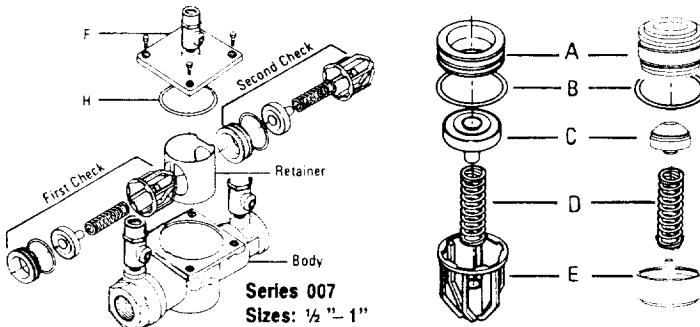
For two valve installations the total capacity of the devices should equal or exceed that required by the system.

The quantity of valves used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.



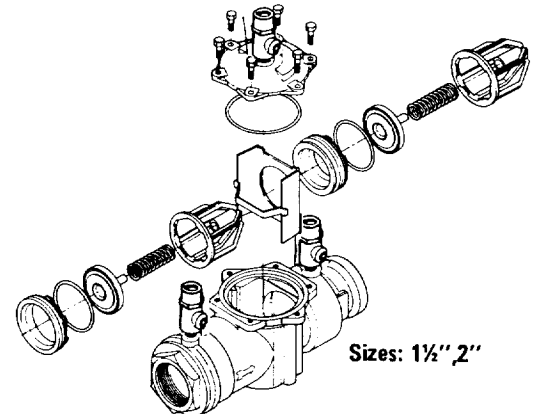
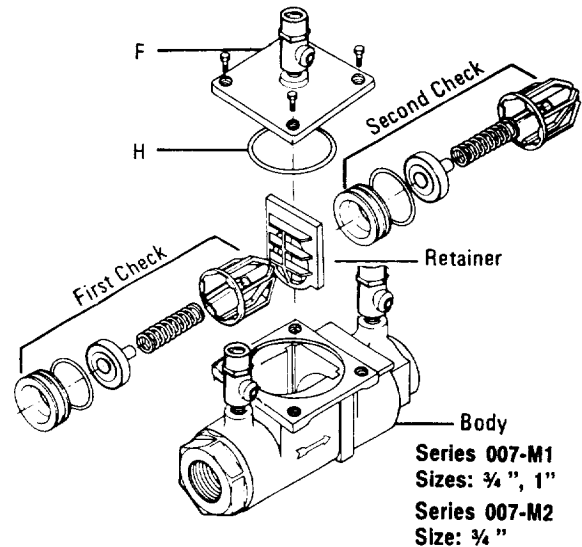
# Service, Replacement Parts and Maintenance

(Before servicing be certain water is turned off or shut-off valves are closed)



## Servicing the First and Second Check Valves:

1. After removing the cover, remove the retainer for the body bore. The check valve modules can now be removed from the valve by hand or with a screwdriver. **Note:** For Series 007 sizes  $\frac{3}{4}$ "-2", the seats and springs of the first and second check modules are **not** interchangeable. The heavier spring and smaller diameter seat belong with the first check module. Series 007M1 sizes  $\frac{3}{4}$ "-1" and Series 007M2  $\frac{3}{4}$ " have interchangeable seats and springs.
2. The check seats are attached to the cage with a bayonet type locking arrangement. Holding the cage in one hand, push the seat inward and rotate counter-clockwise against the cage, for Series 007M2 pull apart seat and cage. The seat, cage, spring and disc assembly are now individual components.
3. The disc assembly may now be cleaned and re-assembled or, depending on its condition, it may be discarded and replaced with a new assembly from the repair kit. O-rings should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease furnished with the service kit.
4. Re-assemble the check valve module in the reverse order. Check modules are installed in the valve body with the seats facing the valve inlet. The modules must be securely in place before the retainer can be replaced. On the  $\frac{3}{4}$ "-1" size, this retainer may have to be tilted slightly into place. Replace cover.



For further details contact your Master Parts Distributor, see back page.

## $\frac{1}{2}$ "-2" Replacement Parts

When ordering, specify Ordering Code Number, Kit Number and Valve Size.

### Check Kits: 1st or 2nd Check

887193	RK 007 CK4	$\frac{1}{2}$ "
887024	RK 007 CK4	$\frac{3}{4}$ "-1"
887026	RK 007M1 CK4	$\frac{3}{4}$ "-1"
887029	RK 007M2 CK4	$\frac{3}{4}$ "
<b>1st Check</b>		
887025	RK 007 CK1	$1\frac{1}{2}$ "-2"
887186	RK 007M1 CK1	$1\frac{1}{2}$ "-2"
<b>2nd Check</b>		
887028	RK 007 CK1	$1\frac{1}{2}$ "-2"
887187	RK 007M1 CK1	$1\frac{1}{2}$ "-2"
<b>Stainless Steel 1st or 2nd Check</b>		
887030	RK 007 CK4 SS	$\frac{3}{4}$ "-1"
887032	RK 007M1 CK4 SS	$\frac{3}{4}$ "-1"
887033	RK 007M2 CK4 SS	$\frac{3}{4}$ "
887031	RK 007 CK1 SS	$1\frac{1}{2}$ "-2"
887035	RK 007M1 CK2 SS	$1\frac{1}{2}$ "-2"
887189	RK 007M1 CK1 SS	$1\frac{1}{2}$ "-2"
887190	RK 007M1 CK2 SS	$1\frac{1}{2}$ "-2"

Kit includes: Seat, Seat O'Ring, Disc Assembly, Spring, Check cage, Cover O'Ring

### Check Rubber Parts - 1st and 2nd Check

887194	RK 007 RC3	$\frac{1}{2}$ "
887040	RK 007 RC3	$\frac{3}{4}$ "-1"
887042	RK 007M1 RC3	$\frac{3}{4}$ "-1"
887043	RK 007M2 RC3	$\frac{3}{4}$ "
887041	RK 007 RC3	$1\frac{1}{2}$ "-2"
887188	RK 007M1 RC3	$1\frac{1}{2}$ "-2"

Kit includes: Seat disc, Seat O'Ring, Cover O'Ring

### Cover Kit

887195	RK 007 C	$\frac{1}{2}$ "
887036	RK 007 C	$\frac{3}{4}$ "-1"
887038	RK 007M1 C	$\frac{3}{4}$ "-1"
887039	RK 007M2 C	$\frac{3}{4}$ "
887037	RK 007 C	$1\frac{1}{2}$ "-2"
887191	RK 007M1 C	$1\frac{1}{2}$ "-2"

Kit includes: Cover, Cover O'Ring

### Complete Rubber Parts

887196	RK 007 RT	$\frac{1}{2}$ "
887199	RK 007 RT	$\frac{3}{4}$ "-1"
887198	RK 007M1 RT	$\frac{3}{4}$ "-1"
887197	RK 007M2 RT	$\frac{3}{4}$ "
887200	RK 007 RT	$1\frac{1}{2}$ "-2"
887192	RK 007M1 RT	$1\frac{1}{2}$ "-2"

Kit includes: Cover O'Ring, 2 Seat discs, 2 Seat O'Rings.



**For technical assistance,  
contact your local Watts Master Parts Distributors:**

ACR SUPPLY CO., INC.  
2719 Hillsborough Road  
Durham, NC 27705  
(800) 442-4044  
Fax (919) 286-7106

ARMIGER ENTERPRISES, INC.  
5405 Lafayette Place  
Hyattsville, MD 20781  
(301) 779-1270  
Fax (301) 779-0127

ASTRA INDUSTRIAL SERVICES, INC.  
3525 Old Conejo Road, Ste. 104  
Newbury Park, CA 91320  
(805) 499-8729  
(800) 776-1464  
Fax (805) 499-9084

BACKFLOW PREVENTION  
SUPPLY INC.  
962 East 900 South  
Salt Lake City, UT 84105  
(801) 355-6736  
Fax (801) 355-9233  
Western States Toll Free  
(800) 733-6730

BACKFLOW APPARATUS &  
VALVE COMPANY  
156 East 162 North Street  
Gardena, CA 90248  
(310) 532-9492 • (714) 891-5605  
Fax (310) 532-0467

BACKFLOW PREVENTION  
DEVICE INSPECTIONS, INC. (BPD)  
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(602) 788-5411  
(800) 266-5411  
Fax (602) 788-6104

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SUPPLY CO., INC.  
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Fax (201) 796-5603

THE BRONSON GROUP #421  
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Sanford, FL 32773  
(407) 330-1642  
(800) 462-1492  
Fax (407) 330-0049

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SUPPLY COMPANY  
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(214) 951-0270  
Fax (214) 637-0749

CONNECTICUT CROSS  
CONNECTION CO.  
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Stratford, CT 06497  
(203) 375-3258  
Fax (203) 378-8326

FERGUSON ENTERPRISES/  
PEEBLES SUPPLY DIVISION  
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Newport News, VA 23602  
(804) 874-7400  
Fax (804) 877-3767

GENERAL ELECTRIC SPECIALTY CO.  
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Jamaica, NY 11423  
(718) 658-2440/2441  
Fax (718) 739-6819

GENERAL PARTS & SUPPLY  
720 East Lake Street  
Minneapolis, MN 55407  
(612) 827-5581 (Twin Cities)  
(800) 279-9980 (Toll free)  
Fax (612) 827-0790  
(800) 279-9981 (Toll free fax)

NATIONAL SALES  
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St. Louis, MO 63110  
(314) 531-3200  
Fax (314) 531-4404

NOEL'S PLUMBING SUPPLY  
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Cincinnati, OH 45210  
(513) 721-5286  
Fax (513) 721-5947

PORTLAND PIPE & FITTING CO.  
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Michael O'Keefe  
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Fax (617) 442-3919

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Indianapolis, IN 46205  
(317) 639-9308  
Fax (317) 639-4567

SOUTHERN PLUMBING SUPPLY CO.  
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Nashville, TN 37201  
(615) 256-6691  
Fax (615) 244-4621

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Houston, TX 77025  
(713) 664-3333  
(800) 392-5066  
Fax (713) 664-4142

V. J. STANLEY  
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Rochester, NY 14608  
(716) 546-4656  
Fax (716) 546-5741

VIKING II  
3300 Princeton N.E., Unit N29  
Albuquerque, NM 87190  
(505) 883-3159  
Fax (505) 883-3218

WATER SPECIALTIES CO., INC.  
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Unit 13-14  
Hooksett, NH 03106  
(603) 668-0088  
(800) 336-6530  
Fax (603) 668-0080

WATERTOWN SUPPLY  
33 Grove Street  
Watertown, MA 02172  
(617) 924-2840  
Fax (617) 924-0428

WOOL WHOLESALE  
PLUMBING SUPPLY  
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Ft. Lauderdale, FL 33304  
(305) 763-3632  
Fax (305) 462-1485

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World Class Valves



— Since 1874 —

**WATTS<sup>®</sup>**  
**REGULATOR**  
WATTS REGULATOR COMPANY

*Backflow  
Prevention  
Division*

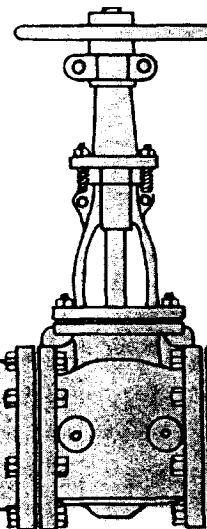
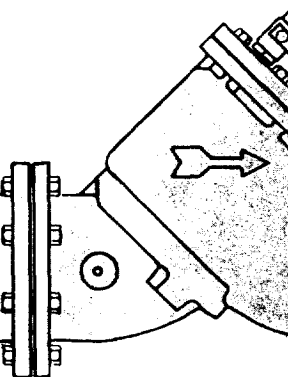
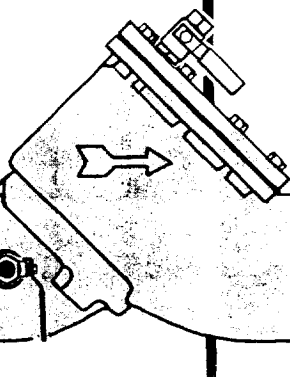
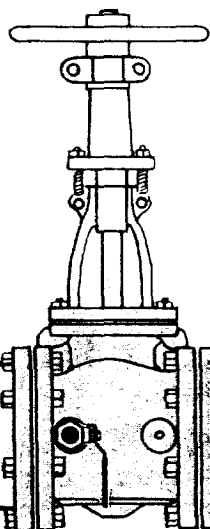
RP/IS-007S 9248

EDP# 1910272 Printed in U.S.A.

Sizes: 3/4" to 10"

# Series 709

## DOUBLE CHECK VALVE ASSEMBLY



BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

ANNUAL INSPECTION of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."

### CROSS CONNECTION CONTROL

- **INSTALLATION**
- **SERVICE**
- **REPLACEMENT PARTS**

For Field Testing Procedure request Bulletin IS-TK-7 and TK-9A-8.  
For Trouble Shooting Guide refer to S-TSG.  
For other Repair Kits and Service Parts refer to RP-BFP.  
See Technical Sales Representative Listing on back page.

World Class Valves

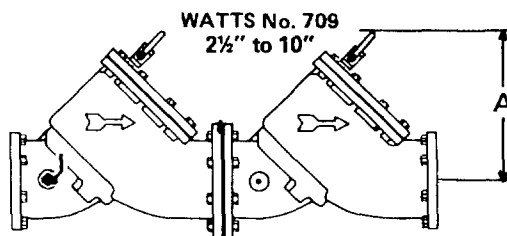
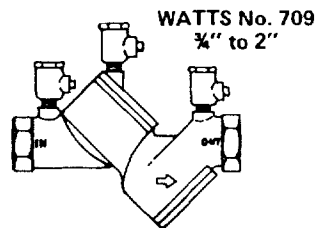


Since 1874

**HDQTRS:** 815 Chestnut St., N. Andover, MA 01845  
**MAIL:** Box 628, Lawrence, MA 01842 **Telex:** 94-7463  
**Tel.** (508) 688-1811 **Fax:** (508) 794-1848/794-1674  
**International Subsidiaries:** Watts Regulator of Canada Ltd.  
**Tel.** (416) 851 8591 **Fax:** (416) 851 8783  
**Watts Regulator (Nederland) b.v.** **Telex:** 844 35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY

# Basic Installation Instructions



Clearance Required for Servicing

	A
2 1/2-3	10"
4	15"
6	15"
8	23"
10	25"

WATTS Series 709 Double Check Valve may be installed in either a vertical or horizontal position.

Install valve in the line with arrow on valve body pointing in the direction of flow.

They should always be installed in an accessible location to facilitate testing and servicing.

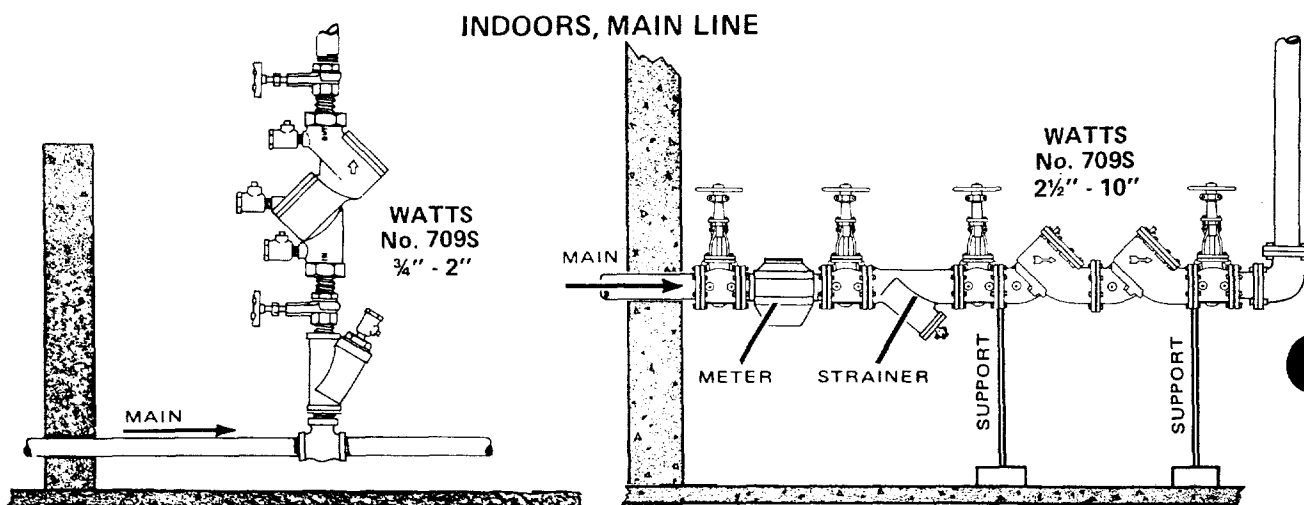
Pipe lines should be thoroughly flushed to remove foreign material before installing the unit. A strainer should be installed as shown, ahead of back-flow preventers to prevent discs from unnecessary fouling.

**CAUTION:** Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon during emergencies, such as fire sprinkler lines, etc.

It is important that Series 709 be tested periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions. (Send for ISTK-7).

## Installation - Indoors, Figure 1

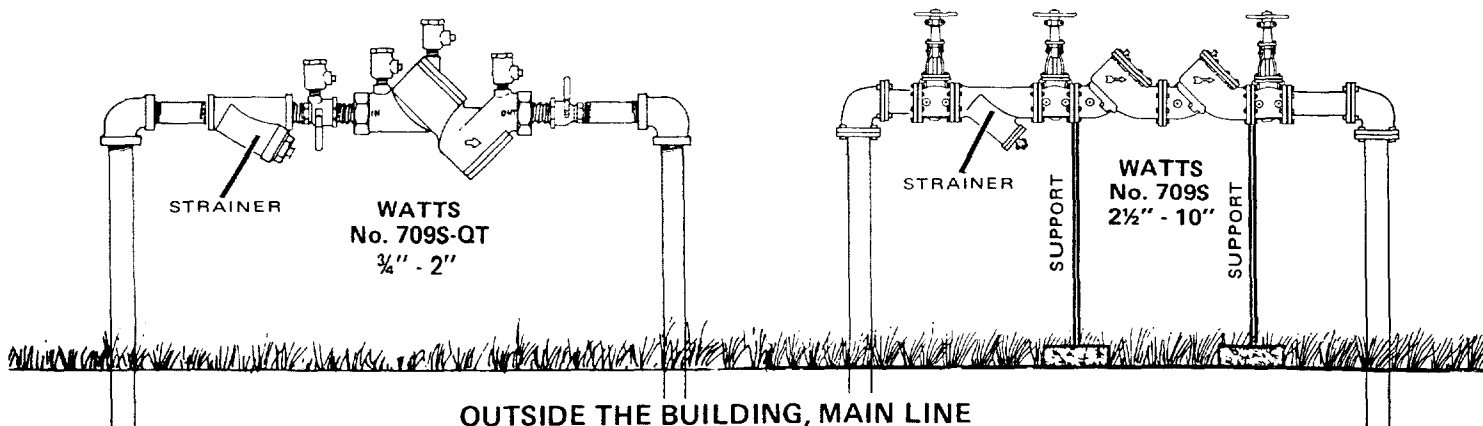
For indoor installations, it is important that the device be easily accessible to facilitate testing and servicing.



## Installation - Outside Building Above Ground, Figure 2

In an area where freezing conditions do not occur, Series 709 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



## Installation - Parallel Devices Figure 3

CONSULT LOCAL CODES FOR APPROVAL

Two or more Series 709 smaller size devices may be piped in parallel (where approved) to serve a larger supply pipe main. This type of installation is employed whenever it is vital to maintain a continuous supply of water / where interruptions for testing and servicing would be unacceptable. It also

has the advantage of providing increased capacity where needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

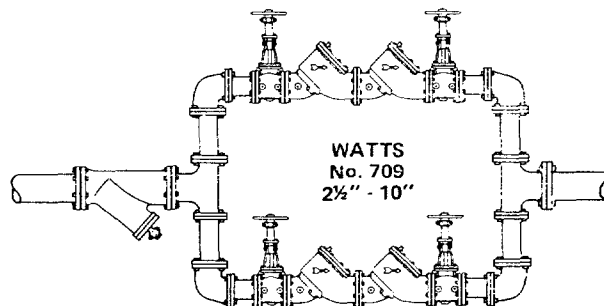
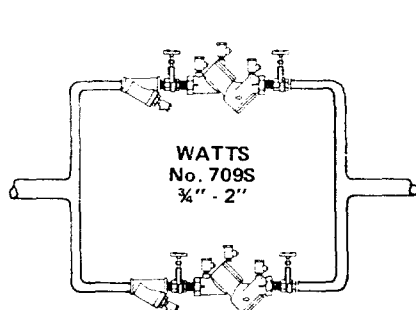
For two valve installations the total capacity of the devices should equal or exceed that required by the system. Table One shows the size of the No. 709 devices required to meet a certain capacity.

The quantity of devices used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.

TABLE ONE – CAPACITY REQUIRED FOR SYSTEM

50 GPM	100 GPM	150 GPM	200 GPM	250 GPM	350 GPM	450 GPM	640 GPM	1000 GPM	2000 GPM	3000 GPM	5000 GPM
Two ¾" Devices	Two 1" Devices	Two 1¼" Devices	Two 1½" Device	Two 1½" Devices	Two 2" Devices	Two 2½" Devices	Two 3" Devices	Two 4" Devices	Two 6" Devices	Two 8" Devices	Two 10" Devices

Table shows total capacity provided with dual valve installations of various sizes.



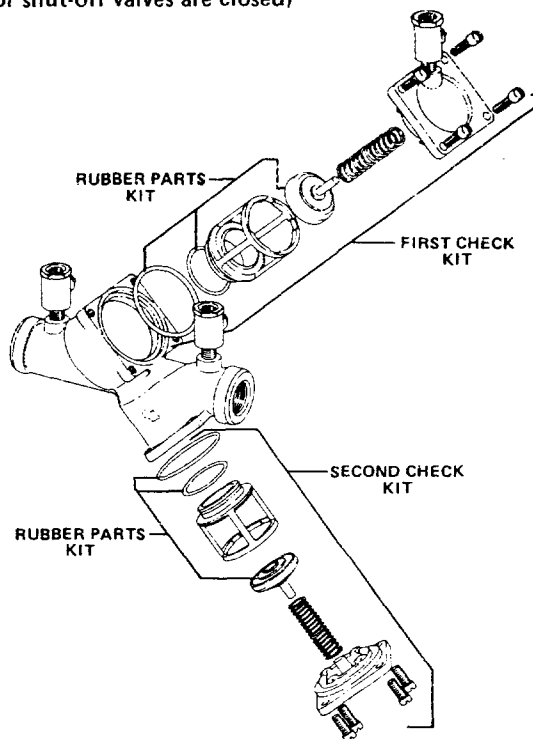
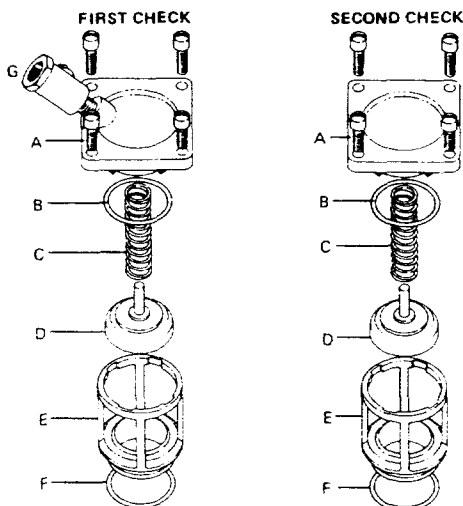
## Service, Replacement Parts and Maintenance

### FIRST and SECOND CHECKS ¾ - 2" Sizes

1. After removing the cover screws, the check comes out with the cover.
2. Holding the check valve module in both hands, rotate the assembly ¼ turn. This will disengage the disc and spring assembly into individual components. The disc assembly may be cleaned or replaced. "O" rings

should be cleaned or replaced as necessary and lightly greased with the FDA approved silicon grease. Reassemble the check valve module in the reverse order. **NOTE:** The springs of the first and second check valves are interchangeable.

(Before servicing be certain water is turned off or shut-off valves are closed)



### Series 709 (All Models) Sizes ¾"- 2" FIRST and SECOND CHECK SERVICE PARTS KIT

Check Kit Includes:

- |                        |                             |
|------------------------|-----------------------------|
| A-Cover                | E-Seat                      |
| B-"O" Ring             | F-Seat "O" Ring             |
| C-Spring               | G-Test Cock (provided with  |
| D-Disc Holder Assembly | ¾" and 1" only) Lubricant * |

Ordering Code No.	Kit No.	Valve Series	Size (In.)
First Check Kit			
881465	13BFP-RK	709	3/4", 1"
881467	15BFP-RK		1 1/2", 2"
Second Check Kit			
881469	17BFP-RK	709	3/4", 1"
881470	18BFP-RK		1 1/2", 2"

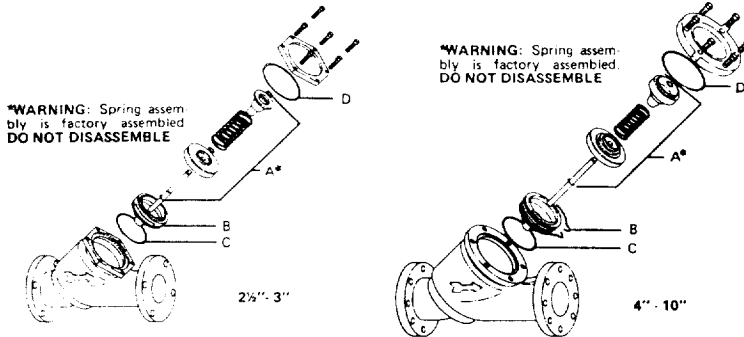
\*Included in First Check Kit only

### Series 709 (All Models)-Sizes ¾"-2" COMPLETE RUBBER PARTS KIT Rubber Parts Kit includes "O" Rings, Check Discs, diaphragm and lubricant

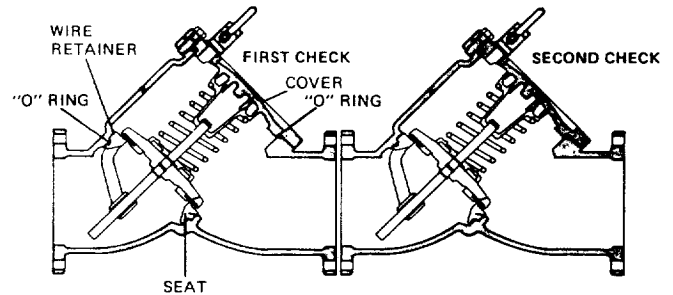
Ordering Code No.	Kit No.	Valve Series	Size (In.)
881302	11BFP-RK	709	¾", 1"
881326	12BFP-RK		1½", 2"

### FIRST AND SECOND CHECKS 2½"- 10" Sizes

1. Remove hatch cover bolts. NOTE: The 709 is designed so that when the bolts are backed off ½" all the spring load is released from the cover and retained by the check module. **CAUTION: Be sure to verify this before removing all the bolts.**
2. Lift check valve module straight out taking care not to hit and damage seat ring.
3. The seat ring may be removed and replaced by pulling out the two wire retainers. The wire retainers are 10" long. One is drawn out clockwise and the other is drawn out counter-clockwise.
4. With the retainer wires removed, the seat ring can be lifted straight up and removed.



**CAUTION:** The check valve disc and spring assembly is in compression. The spring load is captured by the two spring retainers and the stem. The spring retainers are **not** to be removed for servicing. If there is a need to replace the spring, spring retainer or stem, replace the disc and spring assembly. If the disc holder has been damaged by freezing or severe water hammer, it can be replaced in the field. Remove the disc holder retaining ring and slide the disc holder off the stem. Remove the "O" ring from the stem and replace with a new one. Apply grease to the "O" ring and slide the new disc holder into place. Re-install the retaining ring. **NOTE:** the disc holder should not be removed when servicing only the disc, remove allen head screws holding the disc retaining plate and replace disc.



### Series 709 (All Models)-Sizes 2½"-10"

#### FIRST AND SECOND CHECK SERVICE PARTS KIT

Kit Includes:

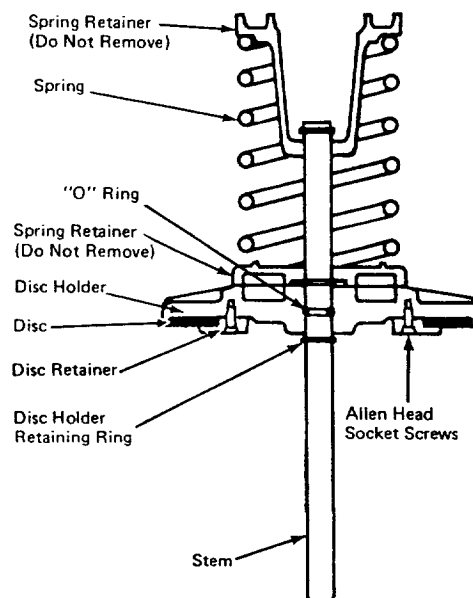
- A-Disc & Spring Assembly
- B-Seat
- C-Seat "O" Ring
- D-Cover "O" Ring
- Lubricant

#### Series 709 (All Models)-Sizes 2½"-10" COMPLETE VALVE RUBBER PARTS KIT

Rubber Parts Kit includes "O" Ring, Check Discs, and Lubricant

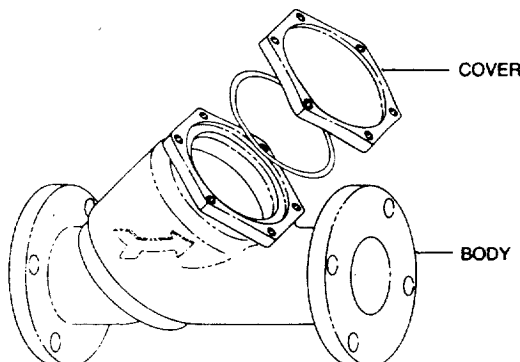
FIRST & SECOND CHECK SERVICE PARTS KIT			
Ordering Code No.	Kit No.	Valve Series	Size (In.)
881476	24BFP-RK	709	2½", 3"
881477	25BFP-RK		4"
881478	26BFP-RK		6"
881479	27BFP-RK		8"
881480	28BFP-RK		10"
COMPLETE VALVE RUBBER PARTS KIT			
833901	29BFP-RK	709	2½", 3"
881335	30BFP-RK		4"
881340	31BFP-RK		6"
881348	32BFP-RK		8"
881352	33BFP-RK		10"

#### DISC and SPRING ASSEMBLY



### Replacement Body/Cover Series 709

For First and Second Check Valves



Ordering Code No.	Valve Series	Size Inches	Description
FIRST AND SECOND CHECK COVERS			
836551	709	2½" & 3" Bronze	909G3
835600		2½" & 3" Iron	909G3-C1
835027		4" Iron	909JA3
835018		6" Iron	909K3
1003122		8" Iron	909L3
1003126		10" Iron	909N3
FIRST AND SECOND CHECK BODIES			
836501	709	2½" Bronze	909G1
835594		2½" Iron	909G1-C1
836504		3" Bronze	909H1
835603		3" Iron	909H1-C1
835007		4" Iron	909J1
835003		6" Iron	909K1
1001821		8" Iron	909L1
1001818		10" Iron	909N1

## TROUBLE SHOOTING GUIDE — Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
A.1	Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device. (Watts ¾"-2" No. 601 bronze valve.)
A.2	Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve. (Watts ¾"-2" No. 601 bronze valve.)
<b>B. Valve drips continually from the vent.</b>			
B.1	Fouled first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
B.2	Damaged or fouled relief valve seat.	No	B.2 Clean or replace the relief valve seat.
B.3	Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.
B.4	Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
B.5	Electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
B.6	Deterioration of checks due to high temp. water usage.	No	B.6 Replace plastic checks with stainless steel checks or replace complete unit with No. 909HW.
<b>C. Valve exhibits high pressure drop.</b>			
C.1	Fouled strainer.	No	C.1 Clean strainer element or replace.
C.2	Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.
<b>D. No water flows downstream of valve.</b>			
D.	Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.
<b>E. Valve does not test properly.</b>			
E.1	Follow test procedure prescribed by USC foundation manual section 9.	No	E.1, E.2 Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves.
E.2	Leaky downstream gate valve.	No	
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
F.	Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.
<b>G. Water spillage on floor.</b>			
G.	Transposed checks 2½"-10" valves	No	G. If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, <b>first</b> check, relief valve, <b>second</b> check, second shut-off valve.
<b>H. Winterization of backflow preventers.</b>			
			H. Electric heat-tape wrap closely together around valve body.
			Build a small shelter around the valve with a large light bulb installed and left on at all times.
			If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.


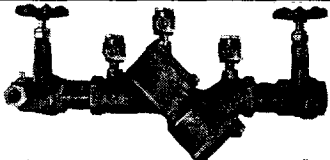
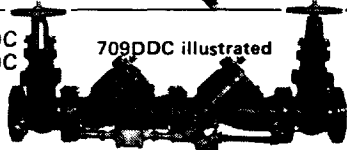
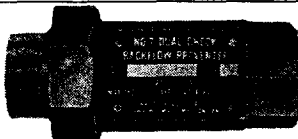


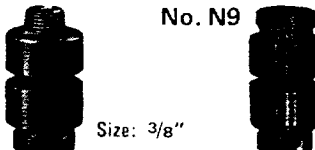
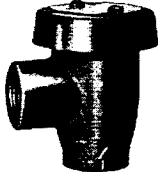
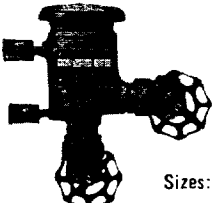
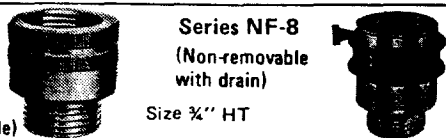
# FOUR BASIC TYPES OF BACKFLOW PREVENTERS

TYPE & PURPOSE	DESCRIPTION	INSTALLED AT	EXAMPLES of INSTALLATIONS
<b>1</b> <b>REDUCED PRESSURE ZONE BACKFLOW PREVENTER</b> <i>For <u>high hazard</u> cross connections.</i>	Two independent check valves with intermediate relief valve. Supplied with shut-off valves and ball type test cocks.	All cross connections subject to backpressure or back-siphonage where there is a high potential health hazard from contamination. Continuous pressure.	Main Supply Lines Commercial Boilers Cooling Towers Hospital Equipment Processing Tanks Laboratory Equipment Waste Digesters Car Wash Sewerage Treatment
<b>DOUBLE CHECK VALVE BACKFLOW PREVENTER</b> <i>For <u>low hazard</u> cross connections.</i>	Two independent check valves. Supplied with shut-off valves and ball type test cocks.	All cross connections subject to backpressure where there is a low potential health hazard or nuisance. Continuous pressure.	Main Supply Lines Food Cookers Tanks & Vats Lawn Sprinklers Fire Sprinkler Lines Commercial Pools
<b>2</b> <b>DOUBLE DETECTOR CHECK VALVE BACKFLOW PREVENTER</b> <i>709DDC low hazard 909DDC high hazard</i>	Double check valve backflow preventers with a water meter and double check or RPZ in by-pass line.	Fire protection system supply main. Detects leaks and unauthorized use of water.	Fire Sprinkler Lines
<b>DUAL CHECK VALVE BACKFLOW PREVENTER</b> <i>For <u>low hazard</u> applications.</i>	Two independent check valves. Checks are removable for testing.	Cross connections where there is a low potential health hazard and moderate flow requirements.	Residential Supply Lines (at the meter)
<b>3</b> <b>BACKFLOW PREVENTER WITH INTERMEDIATE ATMOSPHERIC VENT</b> <i>For <u>moderate hazard</u> cross connections in small pipe sizes</i>	Two independent check valves with intermediate vacuum breaker and relief valve.	Cross connections subject to backpressure or back-siphonage where there is a moderate health hazard. Continuous pressure.  Pump outlet to prevent backflow of carbon dioxide gas and carbonated water into the water supply system to beverage machines.	Boilers (Small) Cooling Towers (Small) Dairy Equipment Residential  Post-Mix Carbonated Beverage Machine
<b>LABORATORY FAUCET DOUBLE CHECK VALVE with INTERMEDIATE VACUUM BREAKER</b> <i>In small pipe sizes for moderate to low hazard.</i>	Two independent check valves with intermediate vacuum breaker and relief vent.	Cross connections subject to backpressure or back-siphonage where there is a moderate to low health hazard.	Laboratory Faucets and Pipe Lines Barber Shop and Beauty Parlor Sinks
<b>ATMOSPHERIC VACUUM BREAKER</b> <i>For <u>moderate to high hazard</u> cross connections.</i>	Single float and disc with large atmospheric port.	Cross connections not subject to backpressure or continuous pressure. Install at least 6" above fixture rim. Protection against back-siphonage only.	Process Tanks Dishwashers Soap Dispensers Washing Machines Lawn Sprinklers
<b>4</b> <b>PRESSURE VACUUM BREAKER</b> <i>For moderate to high hazard cross connections.</i>	Spring loaded single float and disc with independent 1st check. Supplied with shut-off valves and ball type test cocks.	This valve is designed for installation in a continuous pressure potable water supply system 12" above the overflow level of the system being supplied. Protection against back-siphonage only.	Laboratory Equipment Cooling Towers Comm. Laundry Machines Swimming Pools Chemical Plating Tanks Lg. Toilet & Urinal Facilities Degreasers, Photo Tanks Live Stock Water Systems Lawn Sprinklers
<b>HOSE VACUUM BREAKER</b> <i>For residential and industrial hose supply outlets.</i>	Single check with atmospheric vacuum breaker vent.	Install directly on hose bibbs, service sinks and wall hydrants. Not for continuous pressure.	Hose Bibbs Service Sinks Hydrants

NON TOXIC

NON TOXIC

# For Cross Connection Control in Potable Water Distribution Systems

APPLICABLE STANDARDS	WATTS PRODUCT No. AND SIZES
A.S.S.E. No. 1013 A.W.W.A. C506 FCCCHR of USC U.P.C. and S.B.C.C.I. CSA B.64.4 Sizes ¾" - 10" U.L. #EX3185 Sizes 2½" - 10"	Series 909 ¾" - 10" Series 009 ¾" - 2" 
A.S.S.E. No. 1015 A.W.W.A. C506 FCCCHR of USC CSA B.64.5 Sizes ¾" - 10" U.L. #EX3185 Sizes 2½" - 10"	Series 709 ¾" - 10" Series 007 ¾" - 2" 
A.S.S.E. No. 1015 A.W.W.A. C506 FCCCHR of USC CSA B.64.4 U.L. #EX3185	Series 709DDC Series 909DDC 709DDC illustrated  Sizes: 3", 4", 6", 8", 10"
ANSI/A.S.S.E. No. 1024	Series 7 ½" - 1¼" 
A.S.S.E. No. 1012 CSA B.64.3	Series 9D ½", ¾" 
Special Approvals	Series 9BD  Size: ¾" F.C.T.
A.S.S.E. No. 1035 (N-LF9)	Series N-LF9 No. N9  Size: ¾" Sizes: ¼", ¾"
A.S.S.E. No. 1001 ANSI A112.1.1 CSA B.64.1.1 FCCCHR of USC	Series 288A  Sizes: ¼", ¾", ½", ¾", 1", 1¼", 1½", 2", 2½", 3"
A.S.S.E. No. 1020 CSA B64.1.2 FCCCHR of USC	Series 800  Sizes: ½", ¾", 1", 1¼", 1½", 2"
A.S.S.E. No. 1011 CSA B.64.2	Series 8 Series 8A (Non-removable) Series NF-8 (Non-removable with drain) Size ¾" HT 

For additional Cross Connection Control Information, send for brochure "50 Questions and Answers".



# For technical assistance, call your authorized Watts agent.

		Telephone #	Fax #
Trayco Sales, Inc.	P.O. Box 653, Lynnfield, MA 01940	617 334-6078	617 334-2859
W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691	203 873-8693
WMS Sales, Inc.	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 632-0633
WMS Sales, Inc.	7437 Meadowbrook Dr., Baldwinsville, NY 13027	315 622-0763	315 622-0764
WMS Sales, Inc.	4 McMillen Place, Delmar, NY 12054	518 475-1017	
Edwards, Platt & Deely, Inc.	1 Stone Place, Bronxville, NY 10708	Office: 212 671-6400	914 337-5069
	(Warehouse: 263 Royal Ave., Hawthorne, NJ 07506)	800 433-3158	
		Warehouse: N.Y. 914 337-5511	
Vernon Bitzer Associates, Inc.	138 Railroad Dr., Northampton Ind. Pk., Ivyland, PA 18974	215 953-1400	215 953-1250
Bruce Parrott, N.E. Reg. Mgr.	815 Chestnut St., North Andover, MA 01845	508 688-1811	508 794-1848
RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
Smith & Stevenson	4935 Chastain Ave., Charlotte, NC 28210	704 525-3388	704 525-6749
Central Sales Company	2700 Murfreesboro Rd., Antioch, TN 37013	615 361-4244	615 366-1175
Central Sales Company	2170 York Ave., Memphis, TN 38104	901 278-2251	901 272-1614
Spotswood Associates	6700 Best Friend Rd., Norcross, (Atlanta) GA 30071-2919	404 447-1227	404 263-6899
Distributor Sales of Florida	6520 35th St. North, Pinellas Park, FL 33565	813 527-6651	813 528-0602
Earl L. Griffin Co.	2776 B.M. Montgomery St., Birmingham, AL 35209	205 879-3469	205 870-5027
Earl L. Griffin Co.	6517 Buggy Whip Court, Mobile, AL 36695	205 661-1199	
Billingsley & Associates, Inc.	2000 Clearview Pkwy. Suite 201, Metairie, LA 70001	504 885-6771	504 885-7516
Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	
JLM & Assoc., Inc.	P.O. Box 10301, Caparra Heights Station, Rio Piedras, PR 09922-0301	809 782-4244	809 782-6576
The Joyce Agency, Inc.	10520 Warwick Ave., Fairfax, VA 22030	703 591-2808	703 591-0826
	(Warehouse: 7313 Boudinot Dr., Springfield, VA)		
J. B. O'Connor Company, Inc.	120 Union St., Bridgeville, PA 15017	412 221-5300	412 221-4510
Hugh M. Cunningham, Inc.	4309 N. Beltwood Pkwy., Dallas, TX 75244-3294	214 661-0222	214 490-6678
Hugh M. Cunningham, Inc.	1999 Kolfahl, Houston, TX 77023	713 923-2371	713 923-8357
Hugh M. Cunningham, Inc.	5130 Service Center, San Antonio, TX 78218	512 661-4161	512 661-0954
Bill Johnson, S.E. Reg. Director	P.O. Box 140153, Orlando, FL 32814-0153	407 895-3461	407 895-3462
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	708 953-1211	708 953-1067
Mid-Continent Marketing Services Ltd.	10109 Apple Spice Dr., Indianapolis, IN 46236	317 898-8435	317 898-1225
Advance Industrial Marketing Ltd.	923 South Bird St., Sun Prairie, WI 53590	608 837-5005	608 837-2368
Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
The Harris-Billings Co.	P.O. Box 41304, 1920 Annapolis Lane North, Plymouth, MN 55441	612 559-9400	612 559-8239
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-5049
Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
Mack McClain & Associates, Inc.	16037 "N" Circle, Omaha, NE 68135	402 896-8804	402 896-8807
R. R. Iverson/France Co.	8186 E. 44th St., Tulsa, OK 74145	918 664-0423	918 664-6069
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, MO 63143	314 644-5454	314 644-5527
Disney-McLane, Inc.	2704 Colerain Ave., Cincinnati, OH 45225	513 541-1682	513 541-0073
Madsen-Bayer & Associates, Inc.	2510 Englewood Dr., Columbus, OH 43219	614 476-1833	614 476-1846
Madsen-Bayer & Associates, Inc.	4640 Warner Rd., Garfield Heights, OH 44125	216 641-5808	216 641-5546
Gary S. Gilpin Sales Co.	4468 Emberson Ave., Louisville, KY 40209	502 367-2178	502 367-9080
Don Sinsabaugh, MidWest Reg. Sales Mgr.	42 W. 597 Steeple Chase, St. Charles, IL 60175	708 377-3671	708 513-5063
R. C. Hartnett & Associates	30852 Huntwood Ave., Hayward, CA 94544	415 471-7200	415 471-4441
Hollabaugh Brothers & Associates	1260 6th Ave. South, Seattle, WA 98134-1308	206 467-0346	206 467-8368
Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
R. E. Fitzpatrick Sales, Inc.	16 East 8th Ave., Midvale, UT 84047	801 566-7156	801 566-4979
Hudson and Lening Sales Co.	2596 W. Barberry Place, Denver, CO 80204	303 623-1186	303 623-8676
Benisek Associates	2267 Yates Ave., Los Angeles, CA 90040	213 685-9900	213 685-3164
R. D. Wager Company	2012 West 4th St., Tempe, AZ 85281	602 968-8586	602 829-7682
Rocky Mountain Marketing	3300 Princeton N.E., N-27, Albuquerque, NM 87107	505 883-4405	505 881-3767
Crown Sales	360 Mokauea St., Honolulu, HI 96819	808 845-7881	808 841-4504
Jim Engard, West Reg. Sales Mgr.	749 Renate Way, Paso Robles, CA 93446	805 239-8852	805 239-8859
<b>HDQTRS: Watts Regulator Co./EXPORT</b>	815 Chestnut St., No Andover, MA 01845 Telex: 94-7460	508 688-1811	508 794-1848
Watts Regulator of Canada Ltd.	441 Hanlan Rd., Woodbridge, Ontario L4L3T1, Canada	416 851-8591	416 851-8788
Walmar	24 Gurdwara Rd., Nepean Ontario K2E 8A2	613 225-9774	613 225-2972
Currie Agencies Ltd.	3117 Underhill Ave., Burnaby, B.C. V5A 3C8	604 420-6070	604 420-9022
Polymex Controles Inc.	1375 Boul Charest Ouest, Suite 6, Quebec City, Quebec G1N 2E7	418 682-1690	418 682-8743
Watts Regulator of Canada Ltd.	2690 Sabourin, Ville St. Laurent, Quebec H4S 1M2	514 337-9010	514 337-8843
Murray Krovats Sales Agency	941 C Erin St., Winnipeg, Manitoba R36 2W6	709 786-2747	709 775-3186
Bayers-Conte Sales Ltd.	1801-10th Ave. Southwest, Calgary, Alberta T3C 0K2	403 244-1818	403 245-9297
W.B. Gingerich Sales Ltd.	107 Hamilton Rd., New Hamburg, Ontario N0B 2G0	519 662-2460	519 662-2491
S.T.E. Fetterly & Son Ltd.	6080 Young St., Ste. 911, Halifax, NS B3K 5L8	902 454-9377	902 454-6085
Watts Regulator of Nederland b.v.	P.O. Box 98, 6960 AB Eerbeek, Holland Telex 844-35365	(011) 31-8-338-59028	8-338-52073

World Class Valves



**Backflow  
Prevention  
Products**

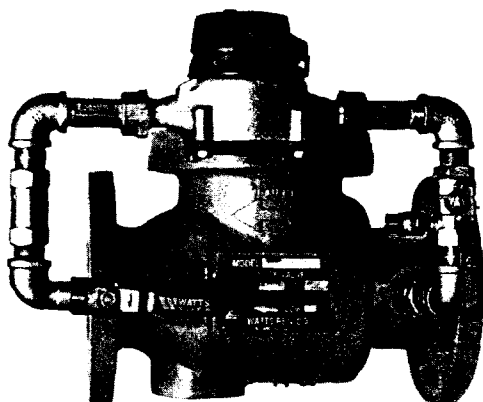
IS-709 912.

Printed in U.S.A.

# Series 07F

## SINGLE DETECTOR CHECK VALVE

Sizes: 4", 6", 8" and 10"



No. 07F (with optional by-pass assembly)

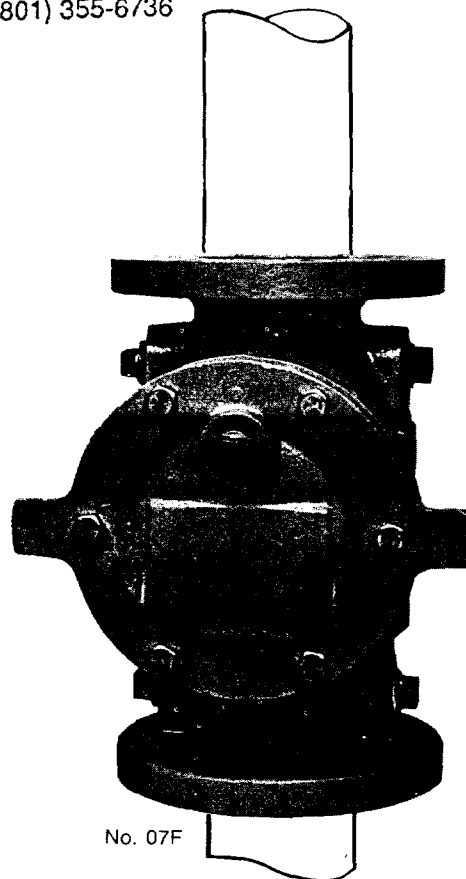
**Option:** ¾ By-pass assembly kits available separately. Kits consist of check valve, CFM or GPM meter, ball valve shut-off and related fittings.

CFM Meter		GPM Meter	
Size	Kit No.	Size	Kit No.
• 4"	101-BP-CFM	• 4"	100-BP-GPM
• 6"	103-BP-CFM	• 6"	102-BP-GPM
• 8"	105-BP-CFM	• 8"	104-BP-GPM
• 10"	105-BP-CFM	• 10"	104-BP-GPM

**Important:** Inquire with Governing Authorities for Local Installation Requirements.

BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

RP/IS 07F



No. 07F

### Series 07F Valves

**No. 07F** . . . . . Flanged connections, less by-pass assembly, body drilled, tapped and plugged

**No. 07FG** . . . . . Same as 07F except with flanged inlet by grooved outlet

## INSTALLATION SERVICE

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**

World Class Valves



**HDQTRS:** 815 Chestnut St., N. Andover, MA 01845  
**MAIL:** Box 628, Lawrence, MA 01842 **Telex:** 94-7460  
**Tel.** (508) 688-1811 **Fax:** (508) 794-1848/794-1674  
**International Subsidiaries:** Watts Regulator of Canada Ltd.  
**Tel.** (416) 851 8591 **Fax:** (416) 851 8788  
Watts Regulator (Nederland)b.v. **Telex:** 844 35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. **THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.**

# Basic Installation Instructions

Series 07F Single Detector Check Valve may be installed in either a vertical or horizontal position.

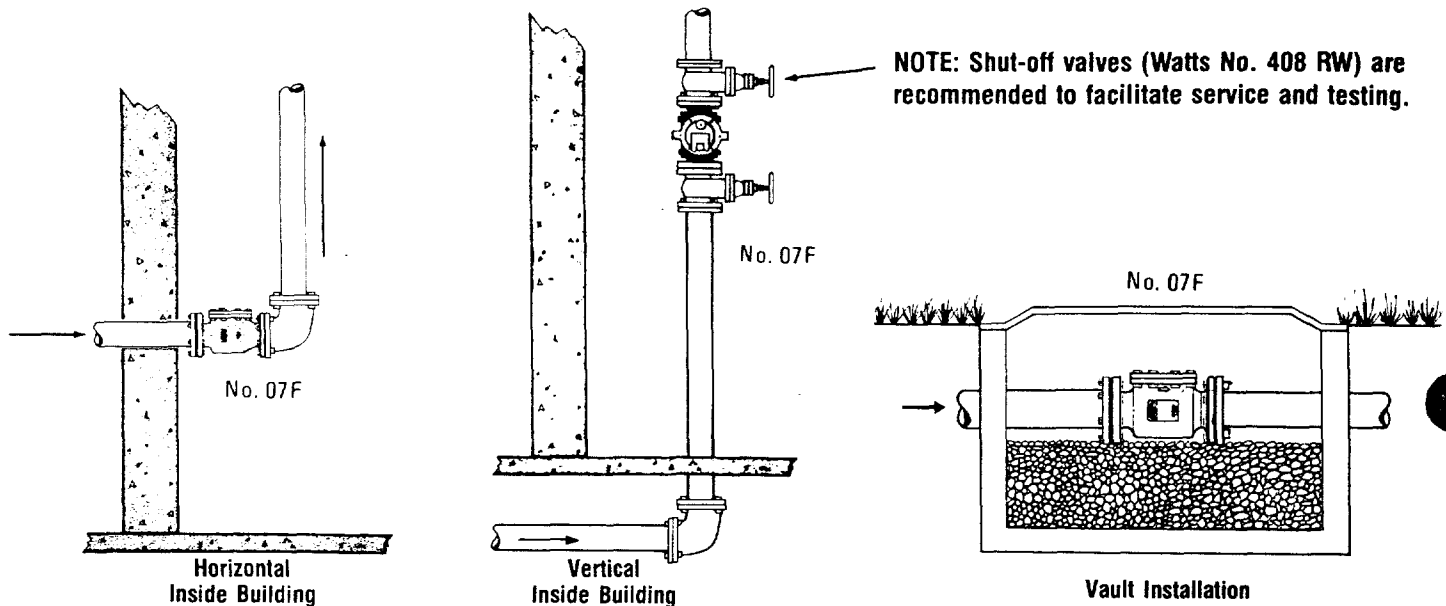
Install valve in the line with arrow on valve body pointing in the direction of flow.

They should always be installed in an accessible location to facilitate testing and servicing.

Pipe lines should be thoroughly flushed to remove foreign material before installing the unit.

Insure adequate drainage in all installations, vaults or indoor.

## Installation – Inside Building, Outside Building & Vault Installations



## Repair Kits

### Rubber Parts Kits

0881525	198 BFP-RK	07F	4"
0881528	201 BFP-RK	07F	6"
0881531	204 BFP-RK	07F	8"

Kits consist of Cover "O" ring, Bolt, "O" ring and Disc and Bracket

### Spring Assembly Kits

0881526	199 BFP-RK	07F	4"
0881529	202 BFP-RK	07F	6"
0881532	205 BFP-RK	07F	8"

Kits consist of Spring assembly and Cover "O" ring

### Complete Repair Kits

0881527	200 BFP-RK	07F	4"
0881530	203 BFP-RK	07F	6"
0881533	206 BFP-RK	07F	8"

Kits consist of Cover "O" ring, Disc & Bracket, Spring Assembly and Bolt "O" ring

# CHECK VALVES 4", 6", 8" and 10"

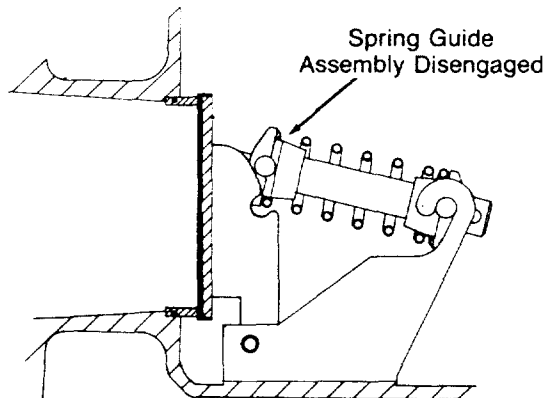
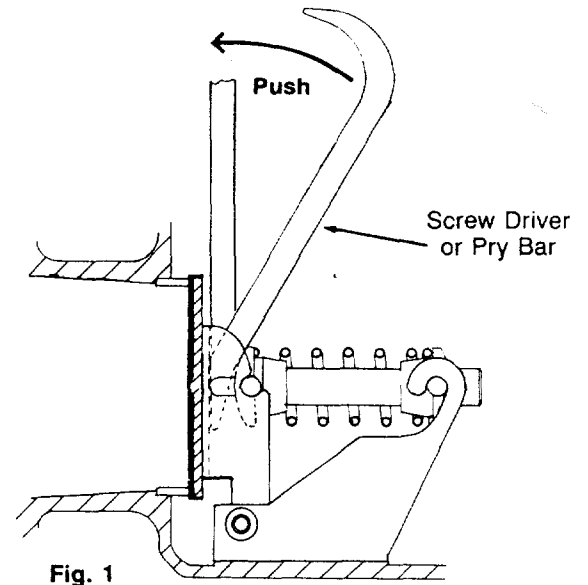
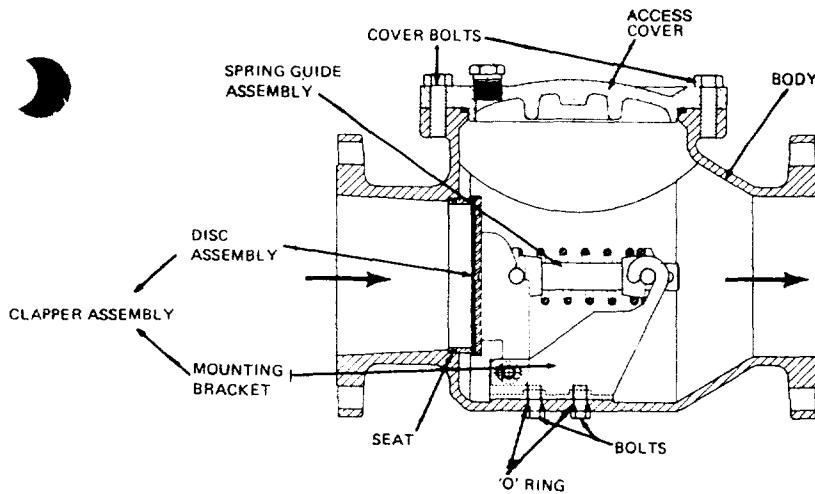


Fig. 2

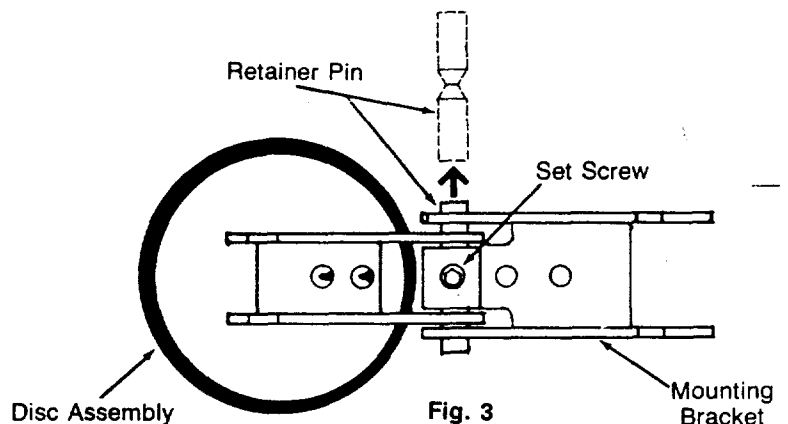


Fig. 3

Top View

## Spring Guide Assembly Removal Instructions

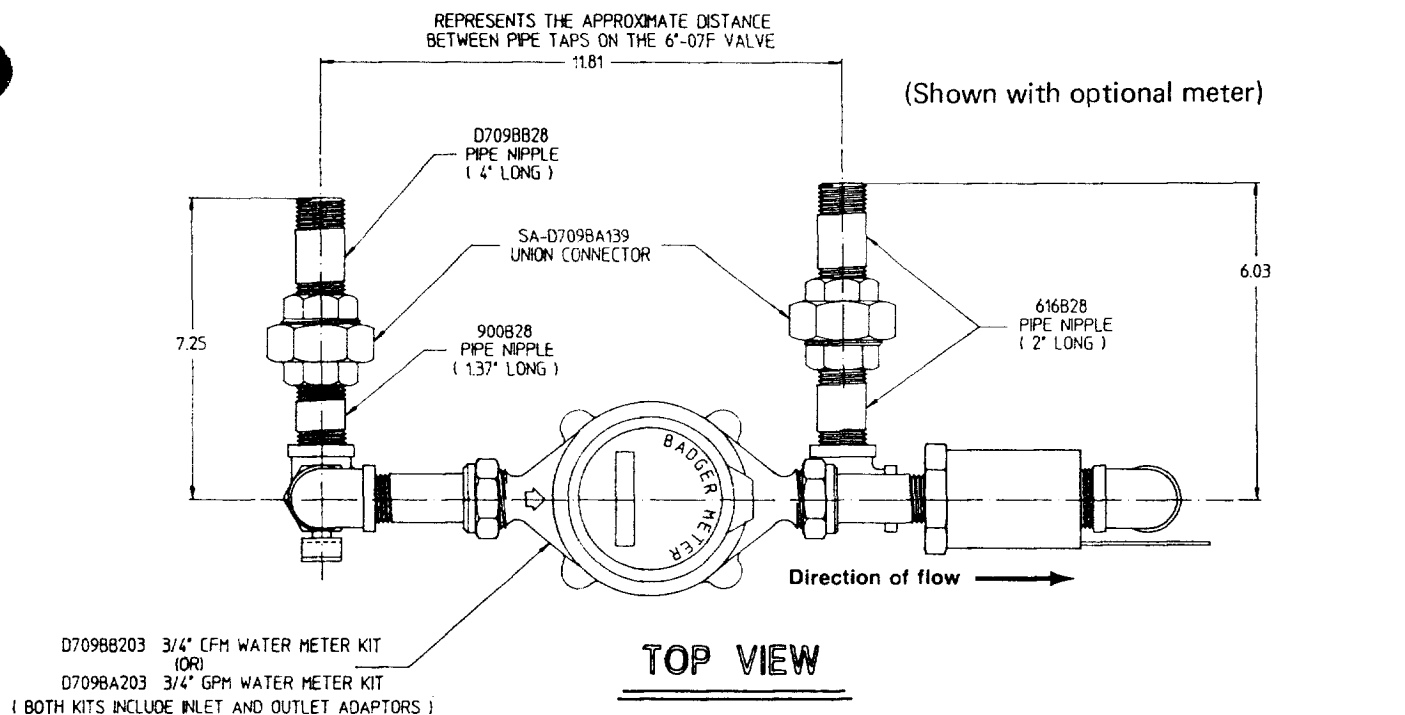
1. The 07F features a captured spring in a center stem guided assembly. The spring guide assembly must be removed to clean the seat disc. As with any spring loaded mechanism, keep fingers away from pinch points. The spring guide assembly has a heavy spring pre-load and could cause injury. It is not necessary to disassemble the spring guide assembly.
2. Remove the access cover.
3. Apply leverage between the spring guide assembly and the disc assembly as shown in Fig. 1.
4. Compress the spring guide assembly slightly so it will pop free from the notches on the disc assembly and rest as shown in Fig. 2.
5. Completely remove the spring guide assembly by unhooking the two outlet end ears from the mounting bracket.

## Disc Assembly Removal Instructions

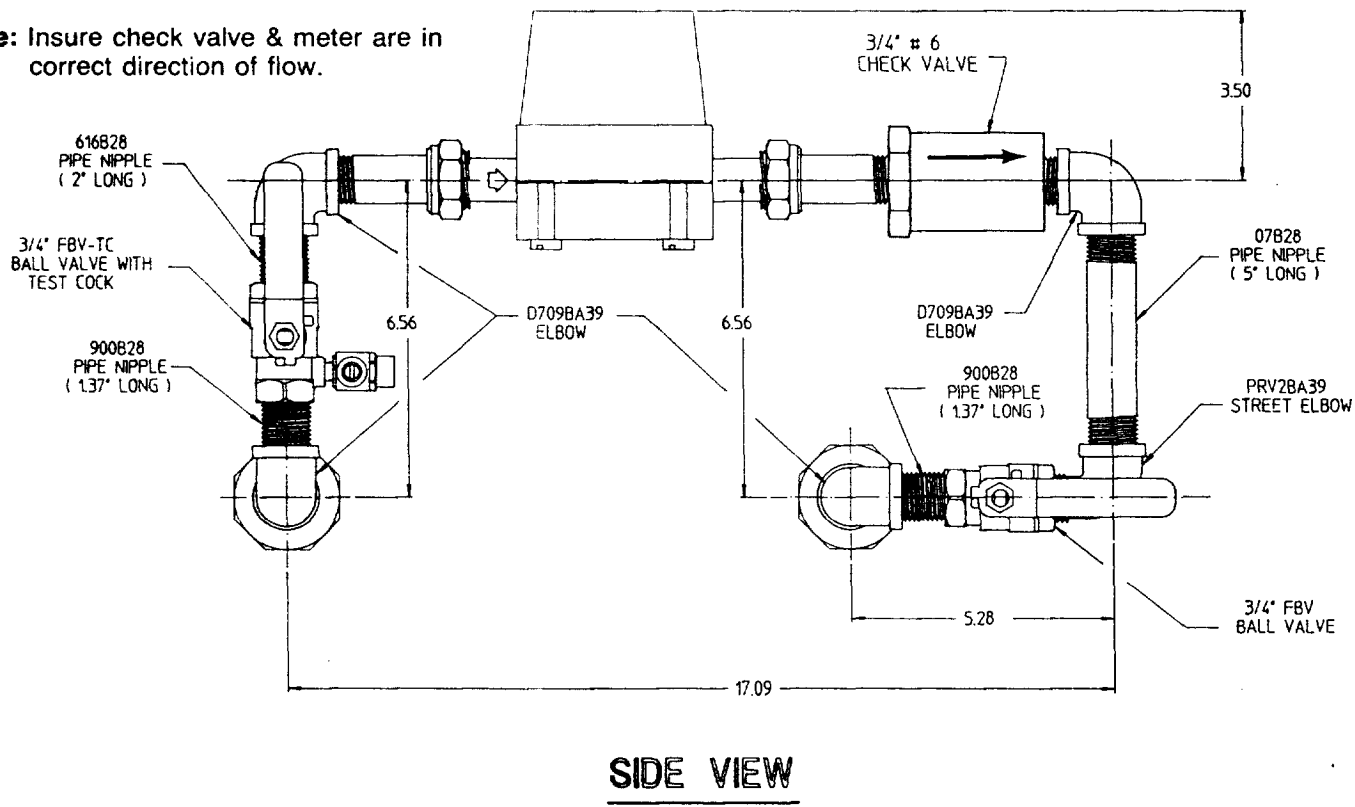
1. Remove the access cover.
2. Remove the spring guide assembly.
3. Unfasten the two bolts on the side of the body opposite the access cover.
4. Reach in through the access opening and remove the entire clapper assembly. Opening the clapper assembly, and laying it flat on a table (refer to Fig. 3).
5. With an allen wrench, remove the set-screw which secures the spacer to the retainer pin on the clapper assembly.
6. Slide out the retainer pin to separate the disc assy from the mounting bracket.

## 4

# Assembly Guide for 6''- 07F By-pass Kit

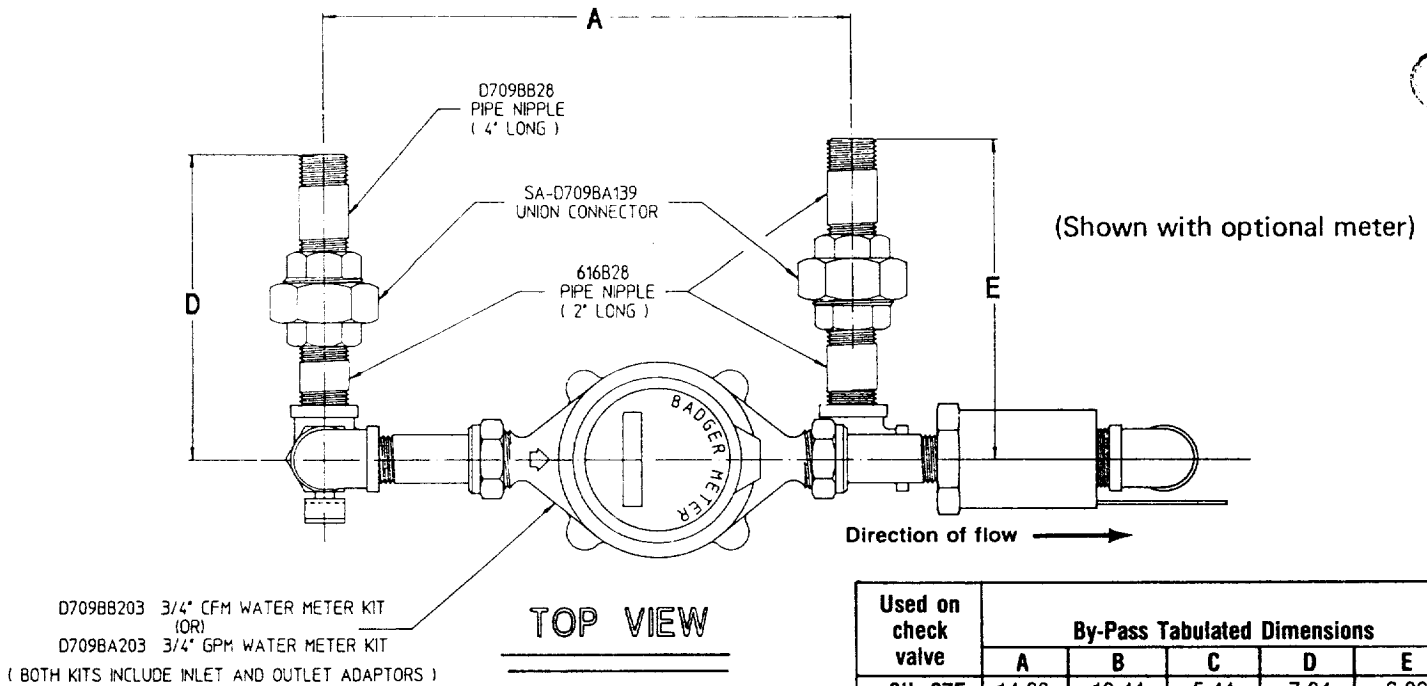


**Note:** Insure check valve & meter are in correct direction of flow.

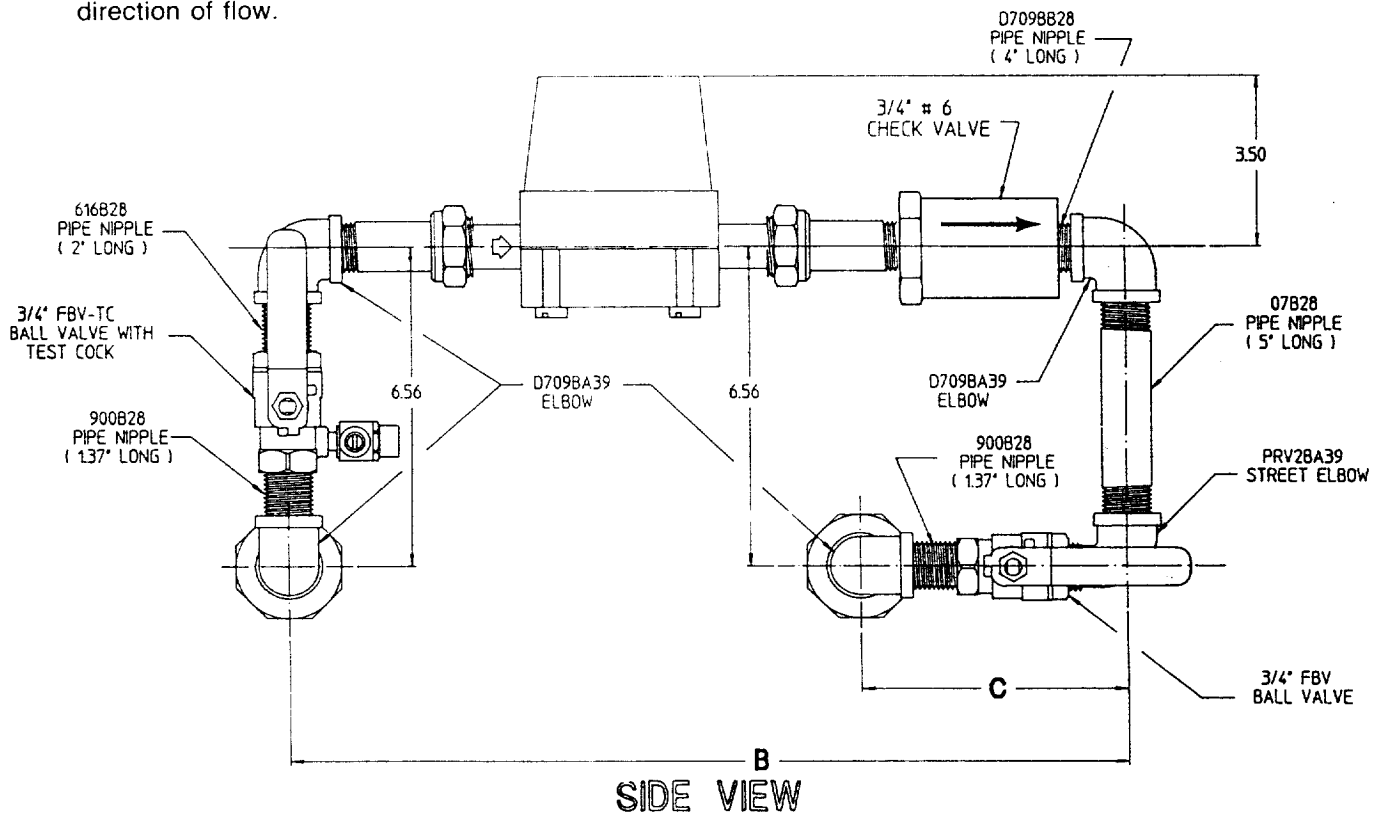


# Assembly Guide for 8" and 10" 07F By-pass Kit

REPRESENTS THE APPROXIMATE DISTANCE  
BETWEEN PIPE TAPS ON THE 8"-07F OR 10"-07F VALVE



**Note:** Insure check valve & meter are in correct direction of flow.



# For Technical Assistance Call Your Authorized Watts Agent

		Telephone #	Fax #
<i>Bruce Parrott, N.E. Reg. Mgr.</i>	815 Chestnut St., North Andover, MA 01845	508 688-1811	508 794-1848
Trayco Sales, Inc.	P.O. Box 653, Lynnfield, MA 01940	617 334-6078	617 334-2859
W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691	203 873-8693
WMS Sales, Inc.	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
WMS Sales, Inc.	7437 Meadowbrook Dr., Baldwinville, NY 13027	315 622-0763	315 622-0764
WMS Sales, Inc.	4 McMillen Place, Delmar, NY 12054	518 475-1017	
Edwards, Platt & Deely, Inc.	931A Conklin St., Farmingdale, NY 11735	516 777-3800	516 777-3810
J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	412 745-5300	412 745-7420
Vernon Bitzer Associates, Inc.	138 Railroad Dr., Northampton Ind. Pk., Ivyland, PA 18974	215 953-1400	215 953-1250
<i>Bill Johnson, S.E. Reg. Director</i>	P.O. Box 140153, Orlando, FL 32814-0153	407 895-3461	407 895-3462
RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
Smith & Stevenson	4935 Chastain Ave., Charlotte, NC 28210	704 525-3388	704 525-6749
Central Sales Company	1612 Fourth Ave. North, Nashville, TN 37208	615 259-9022	615 259-9024
Central Sales Company	2170 York Ave., Memphis, TN 38104	901 278-2251	901 272-1614
Spotswood Associates	6700 Best Friend Rd., Norcross, (Atlanta) GA 30071-2919	404 447-1227	404 263-6899
Distributor Sales of Florida	6520 35th St. North, Pinellas Park, FL 33565	813 527-6651	813 528-0602
Earl L. Griffin Co.	2776 B.M. Montgomery St., Birmingham, AL 35209	205 879-3469	205 870-5027
Earl L. Griffin Co.	6517 Buggy Whip Court, Mobile, AL 36695	205 661-1199	
Billingsley & Associates, Inc.	5609-D Salmen St., Harahan, LA 70123	504 733-7624	504 733-6904
Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
Francisco J. Ortiz & Co., Inc.	P.O. Box 1433, Carolina, Puerto Rico 00984	809 769-0085	809 750-5120
The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
Hugh M. Cunningham, Inc.	4309 N. Beltwood Pkwy., Dallas, TX 75244-3294	214 661-0222	214 490-6678
Hugh M. Cunningham, Inc.	1999 Kolfahl, Houston, TX 77023	713 923-2371	713 923-8357
Hugh M. Cunningham, Inc.	5130 Service Center, San Antonio, TX 78218	512 661-4161	512 661-0954
<i>Don Sinsabaugh, MidWest Reg. Sales Mgr.</i>	42 W. 597 Steeple Chase, St. Charles, IL 60175	708 377-3671	708 513-5063
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	708 953-1211	708 953-1067
Mid-Continent Marketing Services Ltd.	5508 Elmwood Ave., Suite 401, Indianapolis, IN 46203	317 782-1515	317 782-4360
Advance Industrial Marketing Ltd.	1606 Commerce Dr., Sun Prairie, WI 53590	608 837-5005	608 837-2368
Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
The Harris-Billings Co.	P.O. Box 41304, 1920 Annapolis Lane North, Plymouth, MN 55441	612 559-9400	612 559-8239
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-5049
Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
Mack McClain & Associates, Inc.	16037 "N" Circle, Omaha, NE 68135	402 896-8804	402 896-8807
Pro-Spec, Inc.	P.O. Box 472226, Tulsa, OK 74145	918 664-5642	918 664-6069
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, MO 63143	314 644-5454	314 644-5527
Disney-McLane, Inc.	2704 Colerain Ave., Cincinnati, OH 45225	513 541-1682	513 541-0073
Madsen-Bayer & Associates, Inc.	2510 Englewood Dr., Columbus, OH 43219	614 476-1833	614 476-1846
Madsen-Bayer & Associates, Inc.	4640 Warner Rd., Garfield Heights, OH 44125	216 641-5808	216 641-5546
Gary S. Gilpin Sales Co.	4468 Emberson Ave., Louisville, KY 40209	502 367-2178	502 367-9080
<i>Jim Engard, West Reg. Sales Mgr.</i>	749 Renate Way, Paso Robles, CA 93446	805 239-8852	805 239-8859
Steve Govero, Market Mgr. Backflow	276 Ginger Lane, Paso Robles, CA 93446	805 237-2413	805 237-2265
R. C. Hartnett & Associates	30852 Huntwood Ave., Hayward, CA 94544	510 471-7200	510 471-4441
Hollabaugh Brothers & Associates	1260 6th Ave. South, Seattle, WA 98134-1308	206 467-0346	206 467-8368
Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
R. E. Fitzpatrick Sales, Inc.	16 East 8th Ave., Midvale, UT 84047	801 566-7156	801 566-4979
Fanning & Associates, Inc.	625 East 70th Ave., Denver, CO 80229	303 289-4191	303 286-9069
Benisek-Klapp & Associates	2267 Yates Ave., City of Commerce, CA 90040	213 887-2080	213 887-2090
Plumbing/Industrial Representatives	2012 West 4th St., Tempe, AZ 85281	602 968-8586	602 829-7682
Rocky Mountain Marketing	3300 Princeton N.E., N-27, Albuquerque, NM 87107	505 883-4405	505 881-3767
Crown Sales	360 Mokuaea St., Honolulu, HI 96819	808 845-7881	808 841-4504
<b>HDQTRS: Watts Regulator Co./EXPORT</b>	815 Chestnut St., North Andover, MA 01845 <b>Telex: 94-7460</b>	508 688-1811	508 794-1848
Watts Regulator of Canada Ltd.	441 Hanlan Rd., Woodbridge, Ontario L4L 3T1, Canada	416 851-8591	416 851-8788
Walmar	24 Gurdwara Rd., Nepean, Ontario K2E 8A2	613 225-9774	613 225-0673
Currie Agencies Ltd.	3117 Underhill Ave., Burnaby, British Columbia V5A 3C8	604 420-6070	604 420-9022
Polymex Controles Inc.	1375 Boul Charest Ouest, Suite 6, Quebec City, Quebec G1N 2E7	418 682-1690	418 682-8743
Watts Regulator of Canada Ltd.	2690 Sabourin, Ville St. Laurent, Quebec H4S 1M2	514 337-9010	514 337-8843
Krovats/Gregg Associates	941-C Erin St., Winnipeg, Manitoba R3G 2W6	204 786-2747	204 775-3186
DC Sales Corp.	6031-3th St. S.E., Calgary, Alberta T2H 2A5	403 253-6808	403 259-8331
W.B. Gingerich Sales Ltd.	107 Hamilton Rd., New Hamburg, Ontario NOB 2G0	519 662-2460	519 662-2491
Fetterly & Associates	6080 Young St., Suite 911, Halifax, Nova Scotia B3K 5L8	902 454-9377	902 454-6085
Watts Regulator of Nederland b.v.	P.O. Box 98, 6960 AB Eerbeek, Holland <b>Telex: 844-35365</b>	(011) 31-8-338-59028	8-338-52073

World Class Valves



**Backflow  
Prevention  
Division**

RP/IS-07F 9222 Printed in U.S.A.

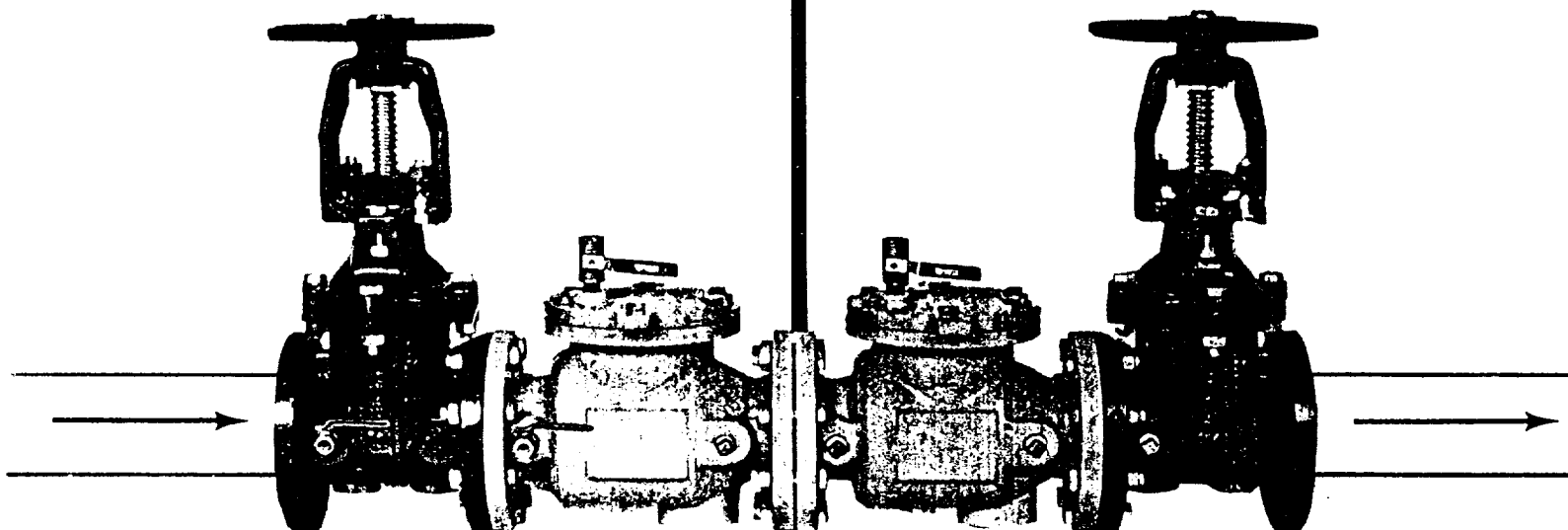


**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**

**Sizes: 4", 6", 8"**

# Series 770

## DOUBLE CHECK VALVE BACKFLOW PREVENTER



### BACKFLOW PREVENTION

- CONTAINMENT • CROSS CONNECTION CONTROL

#### For double Check Valve Backflow Preventers

A double check valve assembly shall be installed at referenced cross connections to prevent the backflow of polluted water into the potable water supply. The assembly shall consist of two independently operating center stem guided check modules. Each check module shall include a captured spring, replaceable seat and replaceable seat disc. The assembly shall also include four ball type test cocks and two resilient seated isolation valves.

**IMPORTANT:** Inquire with governing authorities for local installation requirements.

#### INSTALLATION, SERVICE, REPLACEMENT PARTS and MAINTENANCE

For field testing procedure, send for IS-TK-DP, IS-TK-DR or S-FT-TK9A.

For technical assistance, see back page.

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

**BACKFLOW PREVENTION SUPPLY**  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

World Class Valves



Since 1874  
HQ/TS: 815 Chestnut St., North Andover, MA 01845 USA  
MAIL: Box 628, Lawrence, MA 01842  
Tel. (508) 688-1811  
Watts Industries (Canada) Inc.  
Tel. (416) 851-8591  
Watts Regulator (Nederland) B.V.  
Tel. (508) 794-1848  
Fax: (508) 794-1848  
Fax: (416) 851-8788  
Telex: 844-35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be other invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

# Basic Installation Instructions

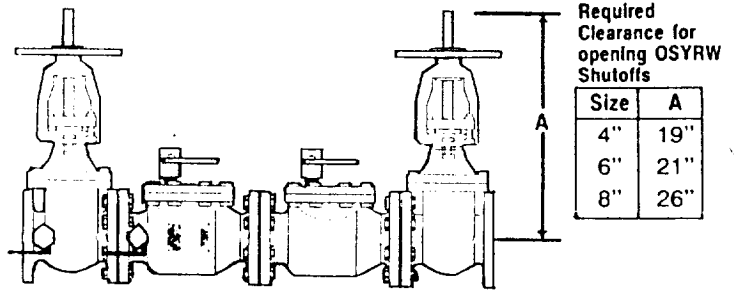
## WATTS Series 770 Double Check Valve

Check with local authorities for installation requirements. Install valve in the line with arrow on valve body pointing in the direction of flow.

They should always be installed in an accessible location to facilitate testing and servicing.

Pipe lines should be thoroughly flushed to remove foreign material before installing the unit. A strainer should be installed as shown, ahead of backflow preventers to prevent discs from unnecessary fouling.

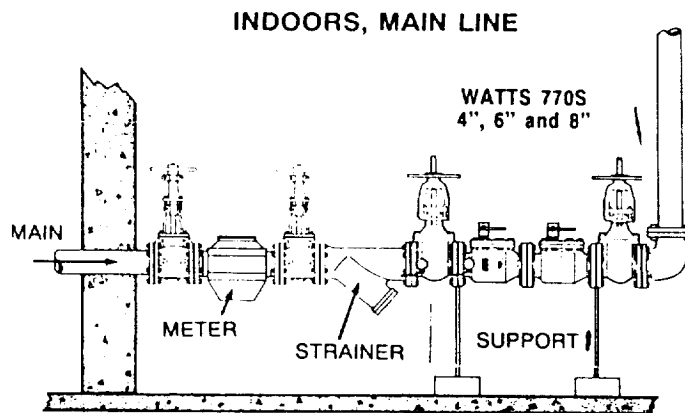
**CAUTION:** Do not install with strainer when backflow preventer is used on seldom-used water lines which are called upon during emergencies, such as fire sprinkler lines, etc.



It is important that Series 770 be tested periodically in compliance with local codes, but at least once a year or more often, depending upon system conditions.

## Installation - Indoors, Figure 1

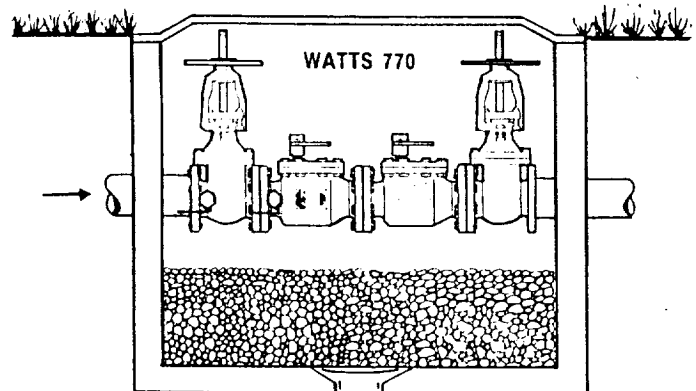
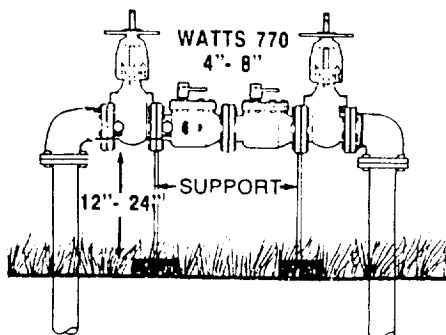
For indoor installations, it is important that the assembly be easily accessible to facilitate testing and servicing.



## Installation - Outside Building Above Ground, Figure 2

In an area where freezing conditions do **not** occur, Series 770 can be installed outside of a building. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



OUTSIDE THE BUILDING, MAIN LINE

## Installation - Parallel Devices

CONSULT LOCAL  
CODES FOR APPROVAL

Two or more Series 770 smaller size valves may be piped in parallel (where approved) to serve a larger supply pipe main. This type of installation is employed whenever it is vital to maintain a continuous supply of water where interruptions for testing and

servicing would be unacceptable. It also has the advantage of providing increased capacity where needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

# CHECK VALVES 4", 6" and 8"

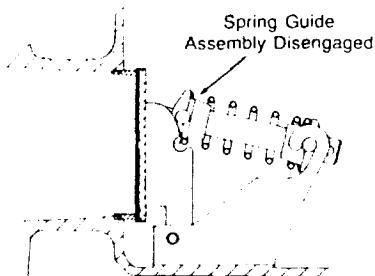
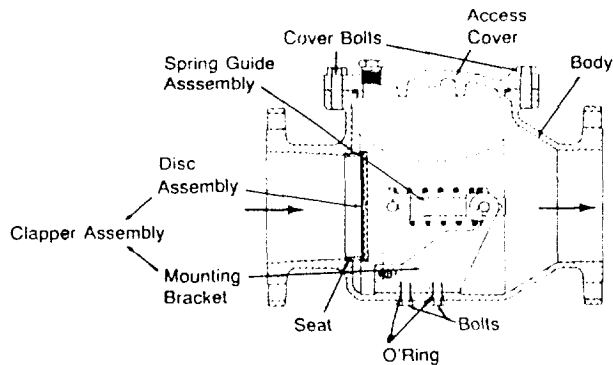


Fig. 2

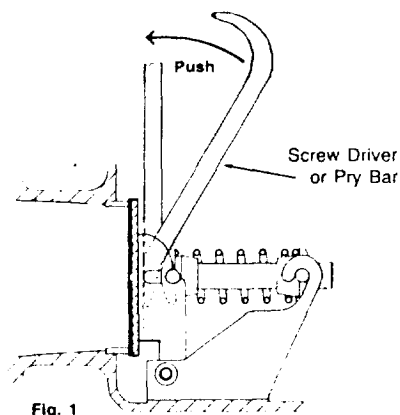


Fig. 1

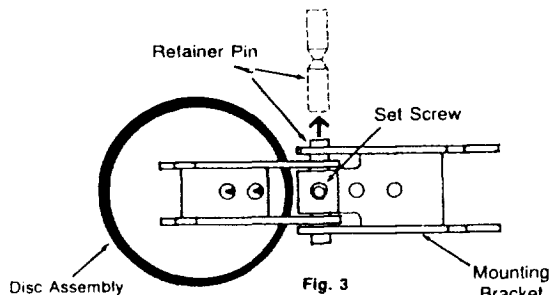


Fig. 3  
Top View

## Spring Guide Assembly Removal Instructions

1. The 770 features a captured spring in a center stem guided assembly. The spring guide assembly must be removed to clean the seat disc. As with any spring loaded mechanism, keep fingers away from pinch points. The spring guide assembly has a heavy spring pre-load and could cause injury. It is not necessary to disassemble the spring guide assembly.
2. Remove the access cover.
3. Apply leverage between the spring guide assembly and the disc assembly as shown in Fig. 1.
4. Compress the spring guide assembly slightly so it will pop free from the notches on the disc assembly and rest as shown in Fig. 2.
5. Completely remove the spring guide assembly by unhooking the two outlet end ears from the mounting bracket.

## Repair Kits

### Check Repair Kits - 770

887070	RK 770 CK4	4"
887071	RK 770 CK4	6"
887072	RK 770 CK4	8"

Kits consist of: Spring Assembly & Cover O'Ring

### Check Rubber Parts - 770

887091	RK 770 RC4	4"
887092	RK 770 RC4	6"
887093	RK 770 RC4	8"

Kits consist of: Cover O'Ring, Bolt O'Ring, Disc - for one check

### Complete Repair Kits - 770

887079	RK 770 T	4"
887080	RK 770 T	6"
887081	RK 770 T	8"

Kits consist of: 2 Cover O'Rings, 2 Bolt O'Rings, 2 Discs, 2 Spring Assemblies - for both checks

### Seat Kits - 770

887085	RK 770 S	4"
887086	RK 770 S	6"
887087	RK 770 S	8"

Kits consist of: Seat, Seat O'Ring - for one check

## Disc Assembly Removal Instructions

1. Remove the access cover.
2. Remove the spring guide assembly.
3. Unfasten the two bolts on the bottom of the body opposite the access cover.
4. Reach in through the access opening and remove the entire clapper assembly. Opening the clapper assembly, and laying it flat on a table (refer to Fig. 3).
5. With an allen wrench, remove the set-screw which secures the spacer to the retainer pin on the clapper assembly.
6. Slide out the retainer pin to separate the disc assy from the mounting bracket.

**IMPORTANT:** Each repair kit fits (1) one check module only order two of the same kit for complete service.

### Check Repair Kits - 770DCDA

887073	RK 770DCDA CK1	4"
887074	RK 770DCDA CK1	6"
887075	RK 770DCDA CK1	8"
887076	RK 770DCDA CK2	4"
887077	RK 770DCDA CK2	6"
887078	RK 770DCDA CK2	8"

Kits consist of: Spring Assembly & Cover O'Ring

### Check Rubber Parts - 770DCDA

887082	RK 770DCDA RC4	4"
887083	RK 770DCDA RC4	6"
887084	RK 770DCDA RC4	8"

Kits consist of: Cover O'Ring, Bolt O'Ring, Disc - for one check

### Complete Repair Kit - 770DCDA

887088	RK 770DCDA T	4"
887089	RK 770DCDA T	6"
887090	RK 770DCDA T	8"

Kits consist of: 2 Cover O'Rings, 2 Bolt O'rings, 2 Discs, 2 Spring Assemblies - for both checks

### Seat Kits - 770DCDA

887094	RK 770DCDA S	4"
887095	RK 770DCDA S	6"
887096	RK 770DCDA S	8"

Kits consist of: Seat, Seat O'ring - for one check

**For technical assistance,  
contact your local Watts Master Parts Distributors:**

ACR SUPPLY CO., INC.  
2719 Hillsborough Road  
Durham, NC 27705  
(800) 442-4044  
Fax (919) 286-7106

ARMIGER ENTERPRISES, INC.  
5405 Lafayette Place  
Hyattsville, MD 20781  
(301) 779-1270  
Fax (301) 779-0127

ASTRA INDUSTRIAL SERVICES, INC.  
3525 Old Conejo Road, Ste. 104  
Newbury Park, CA 91320  
(805) 499-8729  
(800) 776-1464  
Fax (805) 499-9084

BACKFLOW PREVENTION  
SUPPLY INC.  
962 East 900 South  
Salt Lake City, UT 84105  
(801) 355-6736  
Fax (801) 355-9233  
Western States Toll Free  
(800) 733-6730

BACKFLOW APPARATUS &  
VALVE COMPANY  
156 East 162 North Street  
Gardena, CA 90248  
(310) 532-9492 • (714) 891-5605  
Fax (310) 532-0467

BACKFLOW PREVENTION  
DEVICE INSPECTIONS, INC. (BPD I)  
15840 N. 32nd Street  
Phoenix, AZ 85032  
(602) 788-5411  
(800) 266-5411  
Fax (602) 788-6104

BERGEN INDUSTRIAL  
SUPPLY CO., INC.  
30 Stefanic Ave.  
Elmwood Park, NJ 07407  
(201) 796-2600  
Fax (201) 796-5603

THE BRONSON GROUP #421  
1101 Cornwall Road  
Sanford, FL 32773  
(407) 330-1642  
(800) 462-1492  
Fax (407) 330-0049

CENTRAL ENGINEERING &  
SUPPLY COMPANY  
2422 Buller Street  
Dallas, TX 75235  
(214) 951-0270  
Fax (214) 637-0749

CONNECTICUT CROSS  
CONNECTION CO.  
59 Thompson Street  
Stratford, CT 06497  
(203) 375-3258  
Fax (203) 378-8326

FERGUSON ENTERPRISES/  
PEEBLES SUPPLY DIVISION  
618 Bland Boulevard  
Newport News, VA 23602  
(804) 874-7400  
Fax (804) 877-3767

GENERAL ELECTRIC SPECIALTY CO.  
181-04 Jamaica Avenue  
Jamaica, NY 11423  
(718) 658-2440/2441  
Fax (718) 739-6819

GENERAL PARTS & SUPPLY  
720 East Lake Street  
Minneapolis, MN 55407  
(612) 827-5581 (Twin Cities)  
Fax (612) 827-0790

NATIONAL SALES  
4201 Duncan Avenue  
St. Louis, MO 63110  
(314) 531-3200  
Fax (314) 531-4404

NOEL'S PLUMBING SUPPLY  
1200 Walnut Street  
Cincinnati, OH 45210  
(513) 721-5286  
Fax (513) 721-5947

PORTLAND PIPE & FITTING CO.  
82 Gerard Street  
Boston (Roxbury), MA 02119  
Michael O'Keefe  
(617) 442-6950  
Fax (617) 442-3919

SERVICE PIPE &  
SUPPLY, INC.  
302 S. New Jersey Street  
Indianapolis, IN 46205  
(317) 639-9308

Fax (317) 639-4567  
SOUTHERN PLUMBING SUPPLY CO.  
225 Fourth Avenue South  
Nashville, TN 37201  
(615) 256-6691  
Fax (615) 244-4621

STANCO PLUMBING SPECIALTIES  
4155 West Bellfort  
Houston, TX 77025  
(713) 664-3333  
(800) 392-5066  
Fax (713) 664-4142

V. J. STANLEY  
11 White Street  
Rochester, NY 14608  
(716) 546-4656  
Fax (716) 546-5741

VIKING II  
3300 Princeton N.E., Unit N29  
Albuquerque, NM 87190  
(505) 883-3159  
Fax (505) 883-3218

WATER SPECIALTIES CO., INC.  
8 Industrial Park Drive  
Unit 13-14  
Hooksett, NH 03106  
(603) 668-0088  
(800) 336-6530  
Fax (603) 668-0080

WATERTOWN SUPPLY  
33 Grove Street  
Watertown, MA 02172  
(617) 924-2840  
Fax (617) 924-0428

WOOL WHOLESALE  
PLUMBING SUPPLY  
1331 N.E. 12th Avenue  
Ft. Lauderdale, FL 33304  
(305) 763-3632  
Fax (305) 462-1485

WORLY PLUMBING SUPPLY INC.  
503 S. Front Street  
Columbus, OH 43215  
(614) 228-6679  
Fax (614) 228-0098

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**WATTS<sup>®</sup>**  
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Prevention  
Division

RP/IS-770 9247

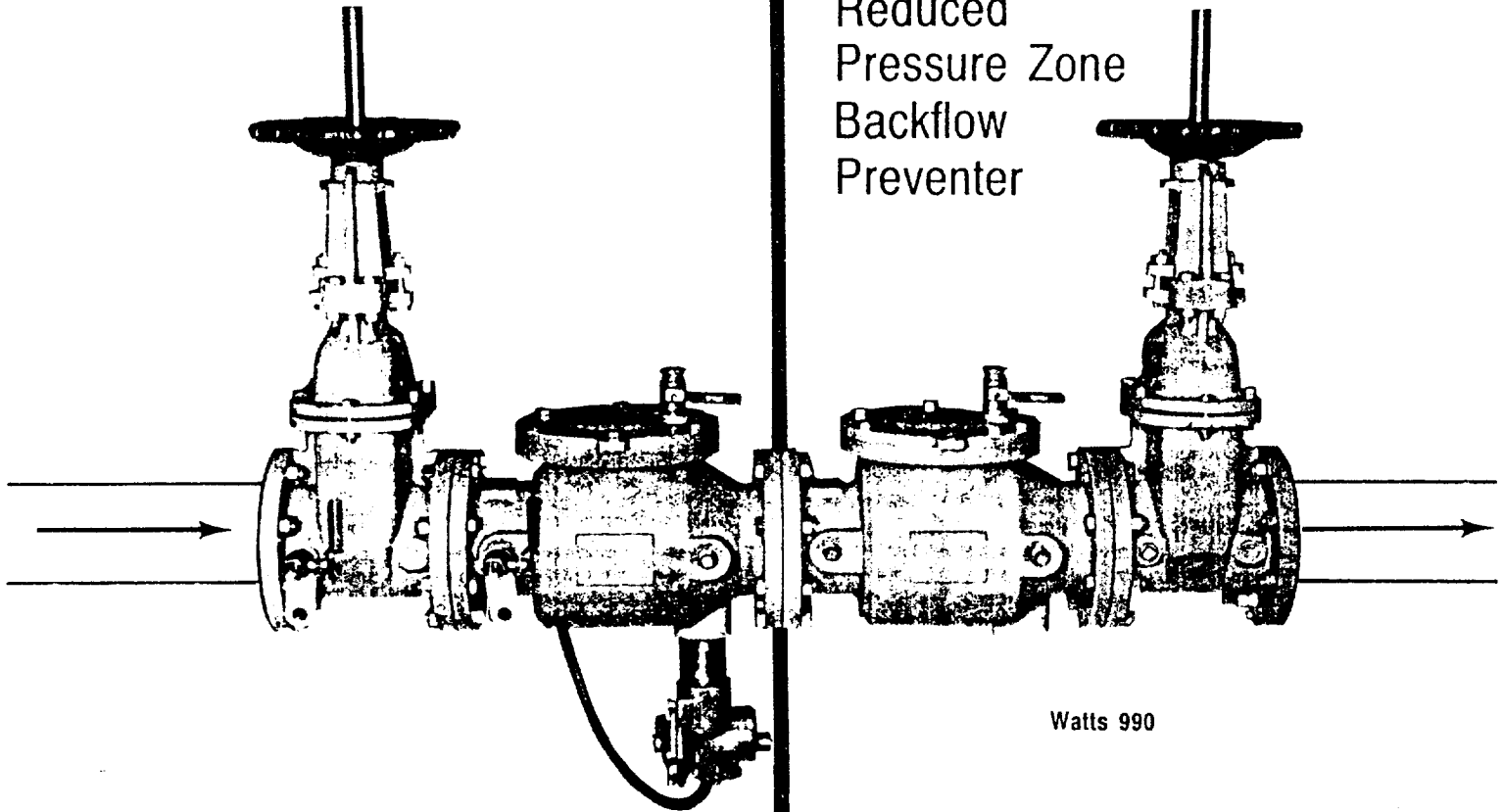
EDP# 1915072 Printed in U.S.A.

**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**

Sizes: 4", 6", 8"

# Series 990/990RPDA

Reduced  
Pressure Zone  
Backflow  
Preventer



Watts 990

## BACKFLOW PREVENTION • CONTAINMENT • CROSS CONNECTION CONTROL

A reduced pressure zone backflow prevention assembly shall be installed at each cross connection to prevent backsiphonage and backpressure backflow of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve, accessible from either side of the assembly, located in a zone between two positive sealing bronze seated stainless steel check valves. The assembly shall feature captured springs, replaceable seats and seat discs in a modular unit. Springs shall be center stem guided. Access to each check module shall be through a top access bolted cover. The relief valve shall be compact bottom mounted with a single discharge port. The assembly shall include two shutoff valves before and after the device and four test cocks. The assembly shall be a Watts Regulator Company Series 990.

**IMPORTANT: Inquire with governing authorities for local installation requirements.**

## INSTALLATION, SERVICE, REPLACEMENT PARTS and MAINTENANCE

For field testing procedure, send for IS-TK-DP, IS-TK-DR or S-FT-TK9A.

For technical assistance, see back page.

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

**BACKFLOW PREVENTION SUPPLY**  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736

World Class Valves



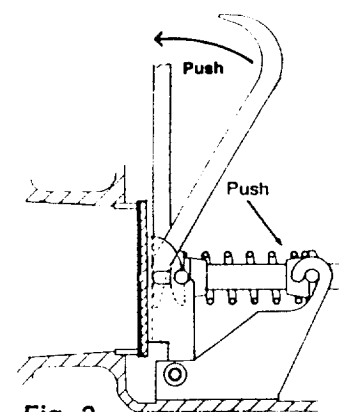
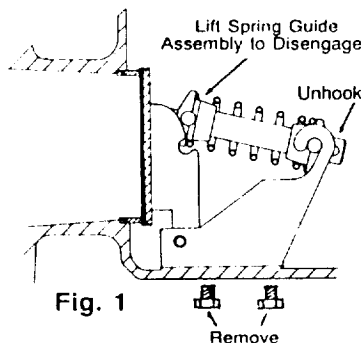
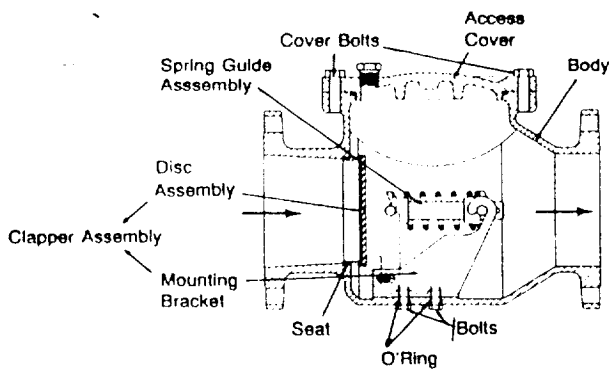
Since 1874  
HQ/TS: 815 Chestnut St., North Andover, MA 01845 USA  
MAIL: Box 628, Lawrence, MA 01842      Telex: 94-7460  
Tel. (508) 688-1811      Fax: (508) 794-1848  
Watts Industries (Canada) Inc.  
Tel. (416) 851-8591      Fax: (416) 851-8788  
Watts Regulator (Nederland) B.V.      Telex: 844-35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be other invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

## TROUBLE SHOOTING GUIDE — Backflow Preventers

PROBLEM	CAUSE	SHOULD VALVE BE REPLACED?	SOLUTION
<b>A. Valve spits periodically from the vent.</b>			
A.1	Fluctuating supply pressure.	No	A.1 Install a soft seated check valve immediately upstream of the device. (Watts ¾"-2" No. 601 bronze valve.)
A.2	Fluctuating downstream pressure.	No	A.2 Install a soft seated check valve downstream of the device close as possible to the shut-off valve. (Watts ¾"-2" No. 601 bronze valve.)
<b>B. Valve drips continually from the vent.</b>			
B.1	Fouled first check.	No	B.1 Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
B.2	Damaged or fouled relief valve seat.	No	B.2 Clean or replace the relief valve seat.
B.3	Relief valve piston "O" ring not free to move due to pipe scale, dirt or build up of mineral deposits.	No	B.3 Clean, grease or replace the piston "O" ring.
B.4	Excessive back pressure, freezing, or water hammer has distorted the second check.	No	B.4 Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 601 to dampen out backpressure and No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing; thaw, disassemble, and inspect internal components. Replace as necessary.
B.5	Electrolysis of relief valve seat or first check seats.	No	B.5 Replace relief valve seat or inlet cover. Install dielectric unions (Watts series 3001 through 3006). Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
B.6	Deterioration of checks due to high temp. water usage.	No	B.6 Replace plastic checks with stainless steel checks or replace complete unit with No. 909HW.
<b>C. Valve exhibits high pressure drop.</b>			
C.1	Fouled strainer.	No	C.1 Clean strainer element or replace.
C.2	Valve too small for flows encountered.	Yes	C.2 Install proper size device based upon flow requirements.
<b>D. No water flows downstream of valve.</b>			
D.	Valve installed backwards.	No	D. Install valve in accordance with flow direction arrow.
<b>E. Valve does not test properly.</b>			
E.1	Follow test procedure prescribed by USC foundation manual section 9.	No	E.1, E.2 Clean or replace gate valve with full port ball valves or resilient wedge shut-off valves.
E.2	Leaky downstream gate valve.	No	
<b>F. Valve quickly and repeatedly fouls following servicing.</b>			
F.	Debris in pipe line is too fine to be trapped by strainer	No	F. Install finer mesh strainer element in the strainer.
<b>G. Water spillage on floor.</b>			
G.	Transposed checks 2½"-10" valves	No	G. If valve is disassembled during installation, caution must be exercised to install check valves in their proper order. Inlet shut-off valve, first check, relief valve, second check, second shut-off valve.
<b>H. Winterization of backflow preventers.</b>			
H.			H. Electric heat-tape wrap closely together around valve body.  Build a small shelter around the valve with a large light bulb installed and left on at all times.  If supply line is not used during the winter, removal of the complete body is the best. This would create an air gap to eliminate any possible backflow.

# CHECK VALVES 4", 6" and 8"



## Spring Guide Assembly Removal Instructions

1. Remove the access cover.
2. The 990 features a captured spring in a center stem guided assembly. The spring guide assembly must be removed to clean the seat disc. To remove the spring assembly from the mounting bracket remove the two bolts on the bottom of the body opposite the access cover. This will allow the spring module to be removed from the notches on the mounting bracket. (Fig. 1) As with any spring loaded mechanism, keep fingers away from pinch points. The spring guide assembly has a heavy spring pre-load and could cause injury. It is not necessary to disassemble the spring guide assembly.

## To Replace

1. Bolt the mounting bracket back in place after lubricating the bolt O'Rings.
2. Position the back of the spring guide into the rear hook of the mounting bracket.
3. Apply leverage between the spring guide assembly and the disc assembly as shown in Fig. 2. Compress spring assembly slightly and push down to position the spring assembly in the front notches.

## 990 Repair Kits

### 1st Check Repair Kits

887315	RK 990 CK1	4"
887316	RK 990 CK1	6"
887317	RK 990 CK1	8"

### 2nd Check Repair Kits

887318	RK 990 CK2	4"
887319	RK 990 CK2	6"
887320	RK 990 CK2	8"

Kits consist of: Spring assembly & Cover O'Ring

### Check Rubber Parts

887321	RK 990 RC4	4"
887322	RK 990 RC4	6"
887323	RK 990 RC4	8"

Kits consist of: Cover O'Ring, 2 Bolt O'Rings & Disc for one check.

### Seat Kits

887330	RK 990 S	4"
887331	RK 990 S	6"
887332	RK 990 S	8"

Kits consist of: Seat & Seat O'Ring - for one check.

### Complete Rubber Parts

887333	RK 990 RT	4"
887334	RK 990 RT	6"
887335	RK 990 RT	8"

Kits consist of: 2 Cover O'Rings, 4 Bolt O'Rings, 2 Discs, 1 Relief valve diaphragm, Relief valve cover O'Ring, Piston O'Rings, Relief valve seat disc & Seat O'Ring.

### Complete Repair Kits

887336	RK 990 T	4"
887337	RK 990 T	6"
887338	RK 990 T	8"

Kits consist of: 2 Cover O'Rings, 4 Bolt O'Rings, 2 Discs, 2 Spring assemblies, Relief valve, Stem assembly, Seat O'ring & Cover O'Ring.

## Disc Assembly Removal Instructions

1. Remove the access cover.
2. Unfasten the two bolts on the bottom of the body opposite the access cover.
3. Remove the spring guide assembly.
4. Reach in through the access opening and remove the entire clapper assembly, opening the clapper assembly and laying it flat on a table. (Refer to Fig. 3)
5. With an allen wrench, remove the set-screw which secures the spacer to the retainer pin on the clapper assembly.
6. Slide out the retainer pin to separate the disc assembly from the mounting bracket.

**Important:** Each check repair kit fits (1) one check module.

## 990RPDA Repair Kits

### 1st Check Repair Kits

887340	RK 990RPDA CK1	4"
887341	RK 990RPDA CK1	6"
887342	RK 990RPDA CK1	8"

### 2nd Check Repair Kits

887343	RK 990RPDA CK2	4"
887344	RK 990RPDA CK2	6"
887345	RK 990RPDA CK2	8"

Kits consist of: Spring assembly & Cover O'Ring

### Check Rubber Parts

887346	RK 990RPDA RC4	4"
887347	RK 990RPDA RC4	6"
887348	RK 990RPDA RC4	8"

Kits consist of: Cover O'ring, Bolt O'Ring & Disc for one check

### Seat Kits

887352	RK 990RPDA S	4"
887353	RK 990RPDA S	6"
887354	RK 990RPDA S	8"

Kits consist of: Seat & Seat O'ring for one check

### Complete Rubber Parts

887361	RK 990RPDA RT	4"
887362	RK 990RPDA RT	6"
887363	RK 990RPDA RT	8"

Kits consist of: 2 Cover O'Rings, 4 Bolt O'Rings, 2 Discs, 1 Relief valve diaphragm, Relief valve cover O'Ring, Piston O'Rings, Relief valve seat disc & Seat O'Ring.

### Complete Repair Kit

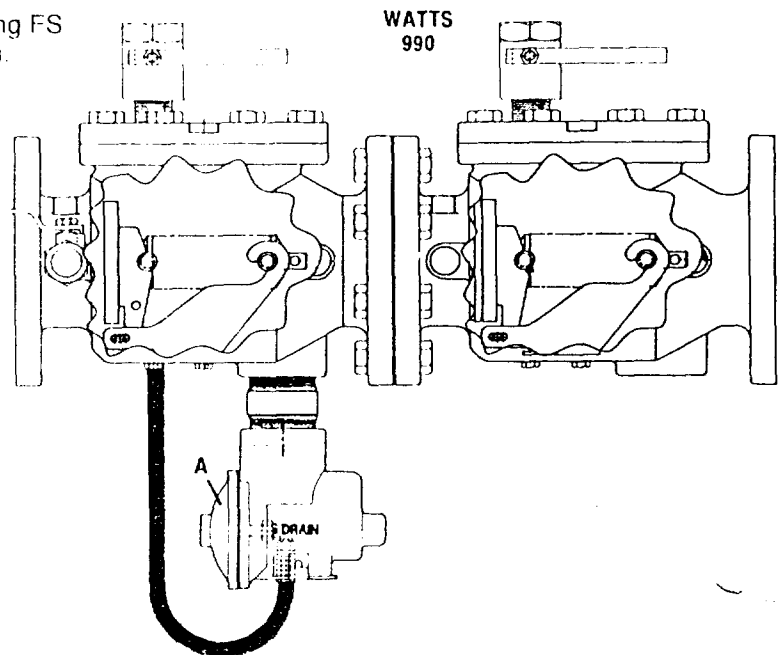
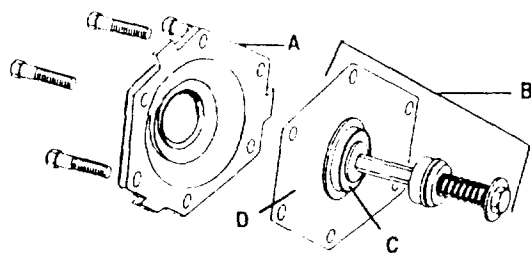
887349	RK 990RPDA T	4"
887350	RK 990RPDA T	6"
887351	RK 990RPDA T	8"

Kits consist of: 2 Cover O'Rings, 4 Bolt O'Rings, 2 Discs, 2 Spring assemblies, Relief valve, Stem assembly, Seat O'ring & Cover O'Ring.

# Servicing the Relief Valve 4" - 8"

## To Service the Relief Valve:

1. Remove sensing hose. Check for debris.
2. Remove cover (A).
3. Remove diaphragm and stem assembly (B). Check seat disc (C) for debris and diaphragm (D) for cuts or tears. Repair or replace as necessary.
4. Lubricate only sealing O'Rings with Dow Corning FS 1292. **Do not** lubricate seat disc or diaphragm.
5. Reassemble and test.



## Relief Valve Repair Kits

### Series 990

#### Relief Valve Total

887327	RK 990 VT	4"
887328	RK 990 VT	6"
887329	RK 990 VT	8"

Kits consist of: Relief Valve, Stem assembly, Seat O'ring & Cover O'Ring.

#### Relief Valve Rubber Parts

887324	RK 990 RV	4"
887325	RK 990 RV	6"
887326	RK 990 RV	8"

Kits consist of: Relief valve diaphragm, Piston O'Rings, Seat disc, Seat O'ring & Cover O'Ring.

### Series 990 RPDA

#### Relief Valve Total

887358	RK 990RPDA VT	4"
887359	RK 990 RPDA VT	6"
887360	RK 990RPDA VT	8"

Kits consist of: Relief valve, Stem assembly, Seat O'ring & Cover O'Ring.

#### Relief Valve Rubber Parts

887361	RK 990RPDA RV	4"
887362	RK 990RPDA RV	6"
887363	RK 990RPDA RV	8"

Kits consist of: Relief valvedaphragm, Piston O'Rings, Seat disc, Seat O'ring & Cover O'Ring.



# Test Procedure for Reduced Pressure Zone Backflow Preventers

The following Test Procedure is one of several that is recognized throughout the United States for verification of the functioning of Backflow preventers.

The following procedure is not a specific recommendation. The Watts series of test kits are capable of performing any of the recognized Backflow test procedures.

- A. Open TC #4 and flush test cocks Nos. 1, 2 and 3 on BF assembly, then close TC #4.
- B. Turn tester on (before connecting hoses). Tester must read all zeros. Close VA and VB.

## Test No. 1 - Relief Valve

1. Install highside hose between TC #2 and tester connection A.
2. Install lowside hose between TC #3 and tester connection B.
3. Open TC #3 then VB. Now open TC #2 slowly, then VA. Close VA then VB.
4. Close #2 shut-off valve.
5. Observe the apparent first check valve differential pressure (A - B).
6. Install bypass hose between VA and VB. Open VB and bleed air by loosening hose connection at VA. Tighten hose connection and close VB.
7. Open VA, then slowly open VB (no more than  $\frac{1}{4}$  turn). When relief valve drips, push the "hold button" for 2 seconds. Record reading (must be 2 PSID or more).

### Push - Print Head (wait) then Push - Start Test

8. Close VA and VB.

## Test No. 2 - Test No. 2 Check Valve

9. Install bypass hose between VA and TC #4. Open VA, then bleed air by loosening hose connection at TC #4. Tighten hose connection. Close VA.

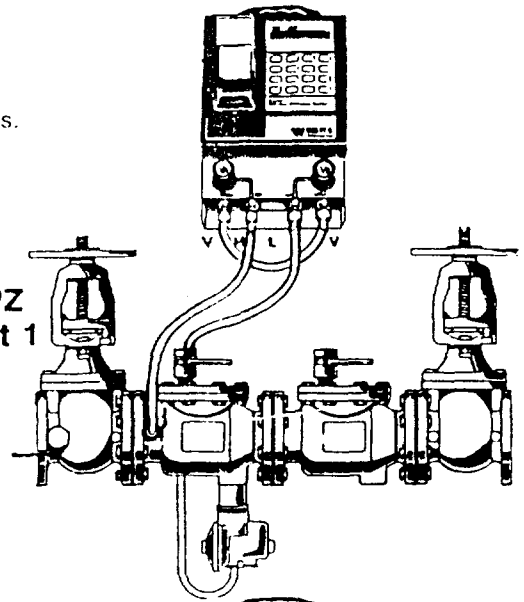
### Push - Start Test

10. Open VB to re-establish pressure withing the "zone". Close VB.
11. Open TC #4 then open VA. If relief valve does not drip, record second check valve as "closed tight".

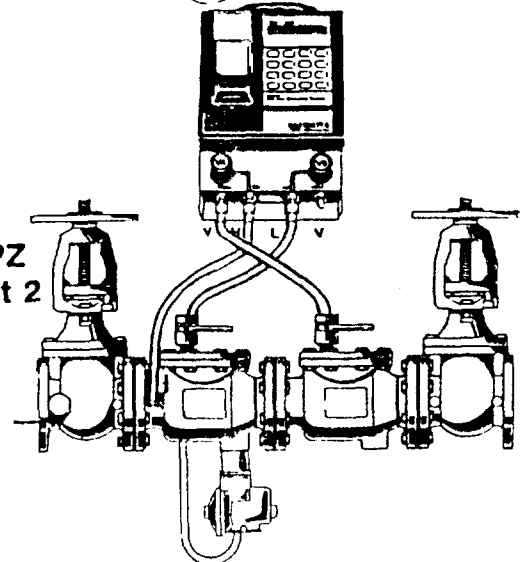
## Test No. 3 - Test No. 1 Check Valve

12. Open VB to re-establish first check valve differential pressure. Close VB. Record pressure differential.
13. Close test cocks and remove tester, return assembly to normal operating condition.

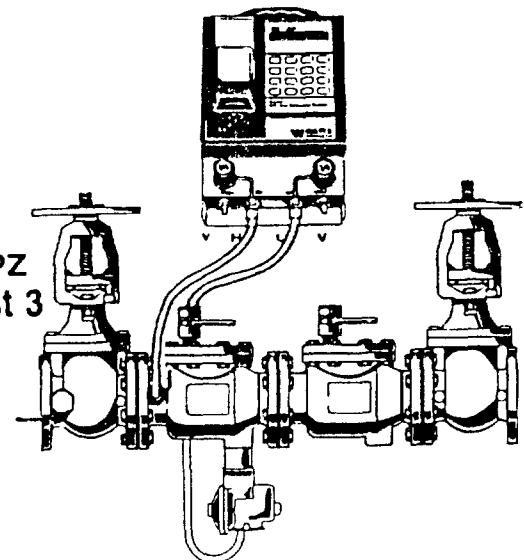
RPZ  
Test 1



RPZ  
Test 2



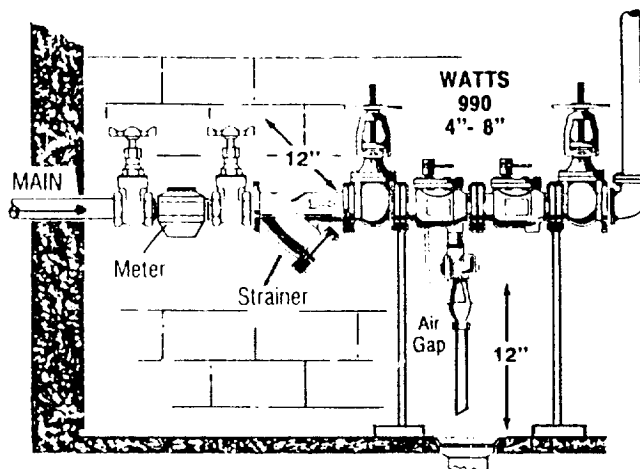
RPZ  
Test 3



## Installation - Indoors

For indoor installations, it is important that the device be easily accessible to facilitate testing and servicing. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap should be piped from the relief valve connection as shown, where evidence of discharge will be clearly visible and so that water damage will not occur. Therefore, never install in concealed locations.

- For Air Gap information contact your technical sales representative on back page.



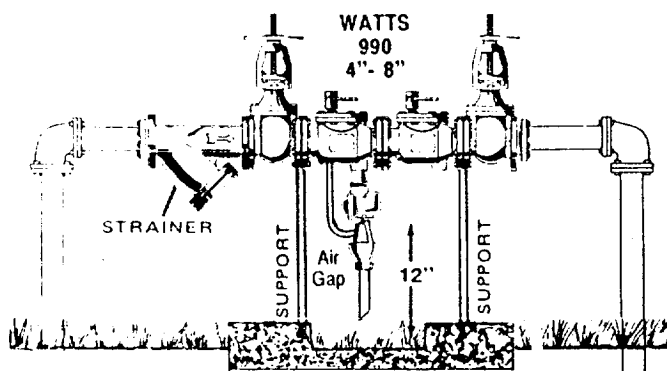
\*Note: For non strainer models, test cock must be located on the first or inlet shut-off valve.

## Installation - Outside Building Above Ground

In an area where freezing conditions occur, Series 990 can be installed inside a protective insulated or heated enclosure. The most satisfactory installation is above ground and should be installed in this manner whenever possible.

Series 990 should be installed in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure that there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer or sump. Series 990 should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

It is generally recommended that backflow preventers never be placed in pits unless absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.

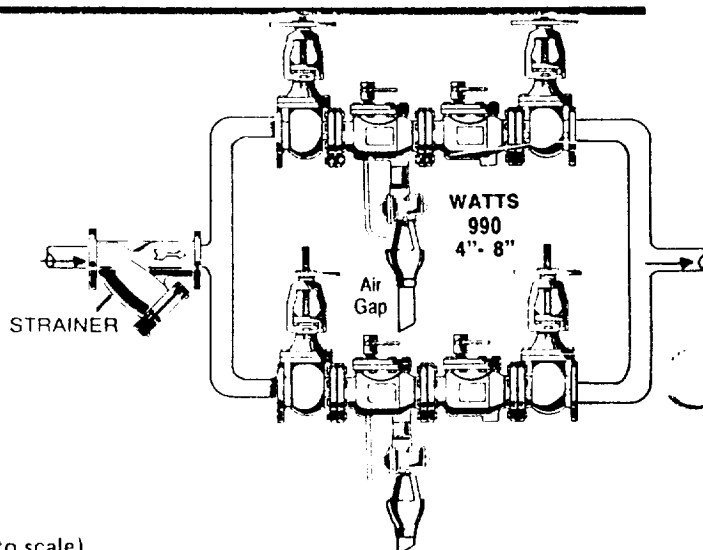


## Installation - Parallel Devices

CONSULT LOCAL  
CODES FOR APPROVAL

Two or more smaller size valves can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

The number of assemblies used in parallel should be determined by the engineer's judgement based on the operating conditions of a specific installation.



# Series 800

## Anti-Siphon Pressure Type Vacuum Breaker

Sizes 1/2" through 2"



1/2" - 2" IAPMO Listed

When installed in accordance with these instructions this valve is designed to prevent back-siphonage of polluted water into a potable water supply. The No. 800 is ideally suited for industrial processing systems and other continuous pressure applications. The valve can be placed in the hot or cold supply lines connected to a potable water supply system where water enters the equipment below its overflow level.

### EXAMPLES:

Where there is no danger of freezing and a drain or run-off is available.

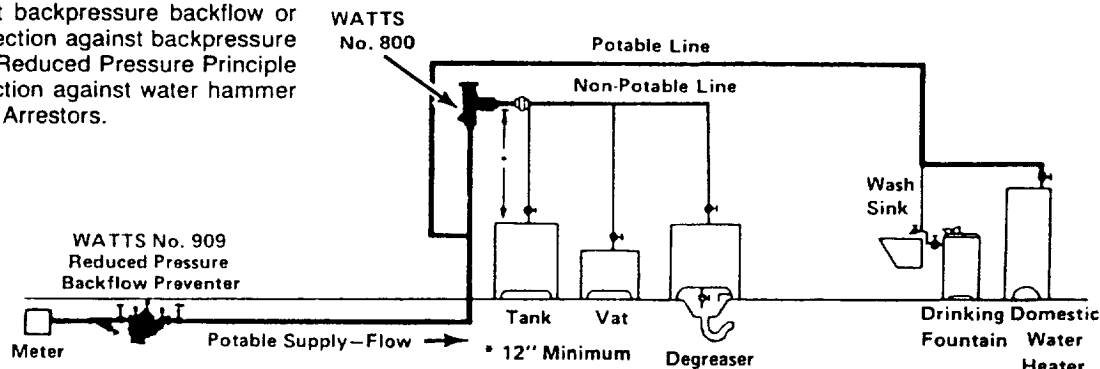
Cooling Tower and Process Water  
Commercial Laundry Machines  
Swimming Pools  
Chemical Plating Tanks  
Photo Tanks  
Large Toilet and Urinal Facilities  
Heat Exchangers  
Degreasers  
Live Stock Water Systems

### PRESSURE - TEMPERATURE

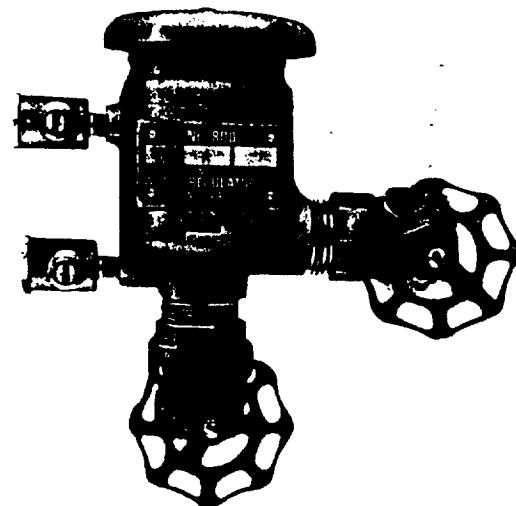
<b>WORKING TEMP:</b>	33°F - 210°F
<b>MAX. PRESSURE:</b>	150 PSI
<b>MIN. PRESSURE:</b>	15 PSI

**Important Note:** Vacuum breakers are not designed, tested or approved to protect against backpressure backflow or water hammer shock. For protection against backpressure backflow, install a Watts #909 Reduced Pressure Principle Backflow Preventer. For protection against water hammer shock install Watts #15 Shock Arrestors.

BACKFLOW PREVENTION SUPPLY  
962 East 900 South  
Salt Lake City, Utah 84105  
(801) 355-6736



ISOLATING POTABLE WATER SYSTEM FROM NON-POTABLE LINE



### IMPORTANT START-UP

ASSE standard 1020 requires that the atmospheric vent valve remains open until the valve body pressure exceeds 1 lb. Until this pressure is reached, some amount of spillage will occur at the atmospheric vent. In order to minimize this leakage on start-up, close the downstream shut-off valve and open inlet shut-off valve quickly.

### OPERATION

When the line pressure drops to 1 psi or below, the spring loaded disc float opens the atmospheric vent and the spring loaded check valve closes the inlet. This prevents the creation of a vacuum in the discharge line and prevents back-siphonage. As water flows through the valve, it pushes the check valve open and lifts the disc float which closes the atmospheric vent, thus preventing leakage. The disc float is free floating without close fitting guides which assures freedom from sticking. The durable silicone disc on the disc float and the check valve permits use on hot and cold water lines.

**WATTS**  
**REGULATOR**  
WATTS REGULATOR COMPANY

HDQTRS: Rte. 114 & Chestnut St., No. Andover, MA 01845  
MAIL: Box 628, Lawrence, MA 01842 Tel.: (508) 688-1811  
Fax: (508) 794-1848/794-1674

International Subsidiaries:  
Watts Regulator of Canada Ltd.  
Watts Regulator (Nederland) b.v.

Telex: 06527137  
Telex: 35365

According to Plumbing Codes this type of valve must be installed as follows:

1. The valve must be installed at least 12" above the overflow level or flood rim of the fixture or container being supplied.
2. The valve must be installed with the supply line connected to the bottom or inlet of the valve and in a vertical position where it is available for periodic inspection, servicing and testing.
3. Because of possible water spillage due to valve operation, the valve must not be installed in a concealed location, inside a wall, or where freezing or spillage will cause water damage when a drain is not available.
4. See "IMPORTANT START-UP" message on reverse side.

## Service and Replacement Parts

Internal parts can be removed, repaired or inspected without removing the valve from the piping.

### DISASSEMBLY

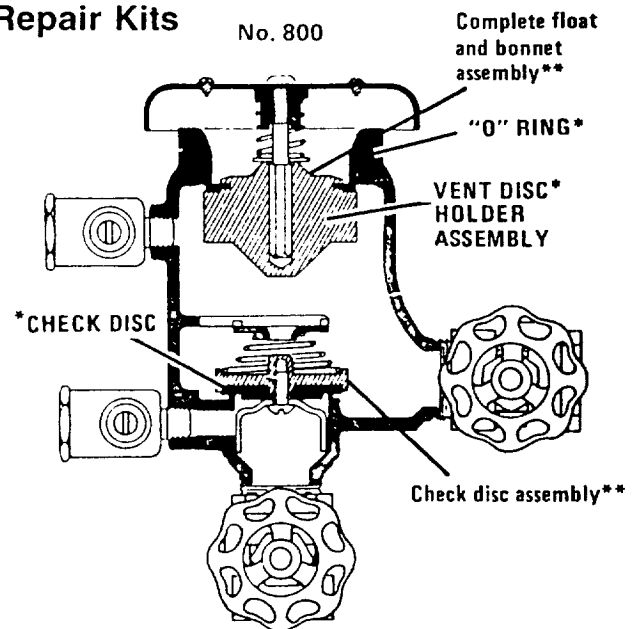
1. Shut off the supply pressure and drain the valve.
2. Remove the two hood screws and the hood.
3. Place a wrench on the parallel flats of bonnet and stem assembly. Turn counter clockwise and remove.
4. Remove the vent disc holder assembly.
5. Press down on the spring retainer and disengage it from the retaining lugs. Then turn 90° and remove.
6. Remove the spring retainer and spring. Note that the large diameter of the spring is down on the guide assembly.
7. Remove the check disc holder and guide assembly.
8. Disassemble the check disc holder assembly.

### REASSEMBLY

Reassemble in the reverse order utilizing the new parts from the repair kit.

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

### Repair Kits



Kit for No. 800 Rubber parts shown above\*  
Kit for No. 800 Service parts shown above\*\*

Ordering Code No.	Kit No.	Size (Inches)
*881231	70 BFP-RK	1/2, 3/4, 1
*881233	71 BFP-RK	1-1/4, 1-1/2, 2
**878651	82 BFP-RK	1/2, 3/4, 1
**878652	83 BFP-RK	1 1/4, 1 1/2, 2

# WATTS REGULATOR

WATTS REGULATOR COMPANY

HQ/TRS: Rte. 114 & Chestnut St., No. Andover, MA 01845

MAIL: Box 628, Lawrence, MA 01842 Telex: 94-7460

Tel. (508) 688-1811 Fax: (508) 794-1848/794-1674

International Subsidiaries:

Watts Regulator of Canada Ltd.

Watts Regulator (Nederland) b.v.

Telex: 06527137

Telex: 35365

**LIMITED WARRANTY:** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

Printed in U.S.A.

# INSTRUCTIONS FOR INSTALLING Series 800M2-QT

## Anti-Siphon Pressure Type Vacuum Breaker

Sizes 1", 1 1/4", 1 1/2", 2"

When installed in accordance with these instructions this valve is designed to prevent back-siphonage of polluted water into a potable water supply. The No. 800 is ideally suited for industrial processing systems and other continuous pressure applications. The valve can be placed in the hot or cold supply lines connected to a potable water supply system where water enters the equipment below its overflow level.

### EXAMPLES:

Where there is no danger of freezing and a drain or run-off is available.

Cooling Tower and Process Water	Swimming Pools
Commercial Laundry Machines	Photo Tanks
Chemical Plating Tanks	Heat Exchangers
Large Toilet and Urinal Facilities	Degreasers
Live Stock Water Systems	

### PRESSURE - TEMPERATURE

WORKING TEMP:	33°F - 140°F
MAX. PRESSURE:	150 PSI
MIN. PRESSURE:	15 PSI

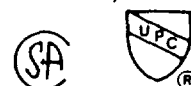
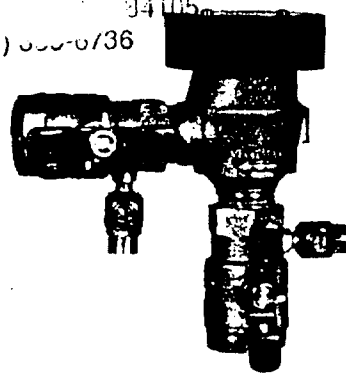
**Important Note:** Vacuum breakers are not designed, tested or approved to protect against backpressure backflow or water hammer shock. For protection against backpressure backflow, install a Watts #909 Reduced Pressure Principle Backflow Preventer. For protection against water hammer shock install Watts #15 Shock Arrestors.

### IMPORTANT START-UP

ASSE standard 1020 requires that the atmospheric vent valve remains open until the valve body pressure exceeds 1 lb. Until this pressure is reached, some amount of spillage will occur at the atmospheric vent. In order to minimize this leakage on start-up, close the downstream shut-off valve and open inlet shut-off valve quickly.

Annual inspection of all water system safety and control valves is required and necessary. Regular inspection, testing and cleaning assures maximum life and proper product function.

952  
Salt Lake  
(801) 555-0736



IAPMO Listed

### OPERATION

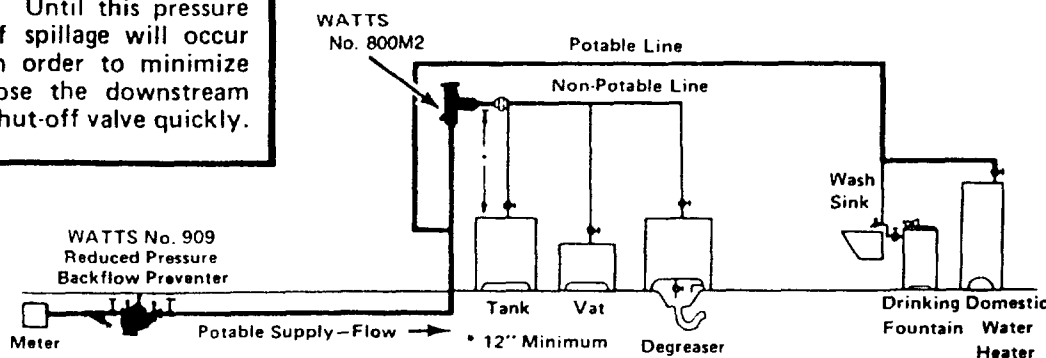
When the line pressure drops to 1 psi or below, the spring loaded disc float opens the atmospheric vent and the spring loaded check valve closes the inlet. This prevents the creation of a vacuum in the discharge line and prevents back-siphonage. As water flows through the valve, it pushes the check valve open and lifts the disc float which closes the atmospheric vent, thus preventing leakage. The disc float is free floating without close fitting guides which assures freedom from sticking. The durable silicone disc on the disc float and the check valve permits use on hot and cold water lines.

### INSTALLATION

According to Plumbing Codes this type of valve must be installed as follows:

1. The valve must be installed at least 12" above the overflow level or flood rim of the fixture or container being supplied.
2. The valve must be installed with the supply line connected to the bottom or inlet of the valve and in a vertical position where it is available for periodic inspection, servicing and testing.
3. Because of possible water spillage due to valve operation, the valve must not be installed in a concealed location, inside a wall, or where freezing or spillage will cause water damage when a drain is not available.
4. See "IMPORTANT START-UP" message.

**"ATTN. INSTALLER: After installation, please leave this Instruction Sheet for occupant's information."**



ISOLATING POTABLE WATER SYSTEM FROM NON-POTABLE LINE

World Class Valves



HQ/RS: Rte. 114 & Chestnut St., No. Andover, MA 01845  
MAIL: Box 628, Lawrence, MA 01842 Telex: 94-7460  
Tel. (508) 688-1811 Fax: (508) 794-1848  
International Subsidiaries:  
Watts Regulator of Canada Ltd.  
Tel: (416) 851 8591 Fax: (416) 851 8788  
Watts Regulator (Nederland) b.v. Telex: 844 35365

**LIMITED WARRANTY** Watts Regulator Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including, without limitation, damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemicals, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. THE COMPANY MAKES NO OTHER WARRANTIES EXPRESS OR IMPLIED EXCEPT AS PROVIDED IN THIS LIMITED WARRANTY.

EDP# 1915171

IS-800M2-QT 9230

**FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS**

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	# ACCEL	TRAN.	ZONE
2A13	1	STAR	DRY	4"	1967	C	0	5	1
3A10	1	RELIABLE	DRY	6"	1967	C-1	0	7	1
14A26	1	RELIABLE	DRY	6"	1967	C-1	0	8	2
14A51	1	GRINNELL	DRY	6"	1953	E-2	0	8	1
10B8	1	GRINNELL	WET	6"	1966	A	0	2	1
12B14	1	RELIABLE	WET	4"	1967	B	0	2	3
1C12	1	GRINNELL	DRY	6"	1982	F3021	0	1	1
12C75	1	RELIABLE	WET	6"	1977	E	0	2	2
3E90	1	RELIABLE	DRY	6"	1962	C-1	0	208	4
F-1	1	AUTO SPRINKLER	DRY	6"	1954	39	0	4	1
F-3	1	AUTO SPRINKLER	DRY	6"	1954	39	0	4	2
F-5	1	AUTO SPRINKLER	DRY	6"	1954	39	0	4	3
F-7	1	AUTO SPRINKLER	DRY	6"	1954	39	0	4	4
F-8	1	AUTO SPRINKLER	DRY	6"	1954	39	0	104	5
F-9	1	AUTO SPRINKLER	DRY	6"	1954	39	0	4	5
F-15	1	AUTO SPRINKLER	DRY	6"	1954	39	0	3	1
F-17	1	GRINNELL	DRY	6"	1979	F3021	0	3	2
1J8	1	AUTO SPRINKLER	DRY	6"	1966	39	0	6	1
3E95	1	GRINNELL	WET	4"	1984	F2001	0	208	2
1163	1	GRIMES	WET	6"	1964	B	0	97	8
1263A	1	STAR	DRY	6"	1970	F	1	67	7
1263B	1	GLOBE	DRY	6"	1964	F	0	67	6
1220	1	VIKING	DRY	6"	1958	G	0	68	2
1227	1	GRINNELL	DRY	6"	1979	F3021	0	67	1
1314	1	VIKING	WET	4"	1965	G	0	212	1
1401A	1	RELIABLE	WET	6"	1973	E	0	94	1
1401B	1	RELIABLE	WET	8"	1973	E	0	94	2
2022	1	STAR	WET	8"	1961	D	0	57	1
2043	1	STAR	WET	6"	1970	D	0		
2044	1	STAR	WET	6"	1970	D	0	74	1
2054	1	RELIABLE	WET	6"	1967	B	0	75	1

**FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS**

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	# ACCEL	TRAN.	ZONE
2109	1	RELIABLE	WET	6"	1970	B	0	61	5
2140A	1	FIREMATIC	WET	8"	1981	F	0	61	1
2140B	1	RELIABLE	WET	8"	1972	B	0	61	2
2160	1	RELIABLE	WET	6"	1970	B	0	62	7
2161	1	RELIABLE	WET	4"	1945	B	0	62	5
2163	1	VIKING	WET	4"	1948	D	0		
2165A	1	HODGEMAN	DRY	3"	1967	C	0	62	1
2165B	1	RELIABLE	WET	6"	1968	B	0	62	1
2166	2	RELIABLE	DRY	6"	1965	C-1	0	62	3
2202A	1	RELIABLE	WET	8"	1972	B	0		
2202B	1	HODGEMAN	DRY	3"	1972	C	0		
2272	1	RELIABLE	WET	6"	1966	B	0	62	2
2275	1	RASCO	WET	4"	1983	E	0		
2400	1	STAR	WET	8"	1970	D	0	59	2
2491	1	STAR	DRY	4"	1950	C	0		
3106A	10	GEM	DELUGE	6"	1983	A-4	0	130	
3106B	2	GEM	WET	4"	1981	F2001	0		
3106C	2	ARROW	LIGHTWATER	2"	1983	CCS15VA	0		
3746	1	MCDONALDMILLER	WET	1 1/2"	1983	A-1	0		
3086	1	RELIABLE	WET	4"	1963	B	0		
3036	2	AUTO SPRINKLER	DELUGE	6"	1963	C	0		
3036B	2	AUTO SPRINKLER	WET	4"	1963	A	0		
3041A	2	VIKING	DELUGE	6"	1963	D	0		
3041B	2	GRIMES	WET	4"	1963	B-1	0		
3052A	2	VIKING	DELUGE	6"	1963	D	0		
3052B	2	VIKING	DRY	4"	1963	G	0		
3065	1	RELIABLE	WET	4"	1964	B	0		
3075A	2	VIKING	DELUGE	6"	1963	D	0		
3075B	2	RELIABLE	WET	4"	1963	B	0		
3077	1	RELIABLE	WET	4"	1964	B	0		
3086	1	STAR	WET	4"	1970	AA	0		

**FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS**

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	# ACCEL	TRAN.	ZONE
3087	1	AUTO SPRINKLER	DELUGE PREACTION	6"	1983	D	0		
3098A	1	STAR	DRY	3"	1974	G	0		
3098B	2	VIKING	DELUGE	6"	1975	D-5	0		
3098C	1	RELIABLE	WET	6"	1974	E	0		
3271	1	STAR	WET	4"	1973	D	0	54	1
3272	1	GLOBE	WET	6"	1983	H-1	0		
3501	1	GEM	DELUGE PREACTION	6"	1978	A-4	0		
3644	1	RELIABLE	WET	4"	1967	B	0		
3741	1	NOTIFIER	WET	2"	1983	WFD2	0		
3751	1	RELIABLE	WET	4"	1968	B	0		
3901	1	RAILSER	DRY	6"	1952	C	0	52	1
4060	1	RELIABLE	DRY	6"	1968	C-2	0	94	2
4076	2	RELIABLE	DRY	6"	1952	C	0	82	1
4170	1	RELIABLE	DRY	6"	1979	D	0	70	3
4175	2	RELIABLE	DRY	6"	1952	C	0	82	2
4220	1	HODGEMAN	DRY	3"	1943	C	0	72	1
4246	1	HODGEMAN	DRY	3"	1962	C	1	73	3
4274	1	RELIABLE	WET	6"	1962	B	0		
4301	1	RELIABLE	WET	4"	1965	B	0	78	1
4320	2	AUTO SPRINKLER	DRY	6"	1983	39	0		
5172	1	GRINNELL	WET	6"	1981	F2001	0		
5275A	2	RELIABLE	WET	6"	1986	E	0		
5275B	1	RELIABLE	WET	8"	1986	E	0		
8085	1	AUTO SPRINKLER	WET	6"	196	153	0	11	1
9500A	1	VIKING	WET	4"	1955	G	0	18	2
9500B	1	RELIABLE	DRY	6"	1957	C	0	18	3
9504	1	STAR	WET	6"	1970	D	0	17	1
9575	1	AUTO SPRINKLER	DRY	6"	1966	39	0	85	2
9570A	2	RELIABLE	WET	8"	1943	B	0	29	142
9570B	1	RELIABLE	WET	6"	1943	B	0	29	3
9570C	1	RELIABLE	DRY	6"	1943	C	1	29	2



FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	# ACCEL	TRAN.	ZONE
9579	1	RELIABLE	DRY	6"	1958	C	0	85	3
9580A	6	GRINNELL	WET	8"	1940	A	0		
9580B	1	STAR	DRY	4"	1950	C	0		
9582	1	GRINNELL	DRY	6"	1959	E-2	0	18	4
9630A	1	RELIABLE	DRY	6"	1944	C	1	84	2
9630B	1	RELIABLE	WET	8"	1944	B	0	84	3
9630C	1	AUTO SPRINKLER	WET	8"	1951	A-1	0	84	4
9630D	1	RELIABLE	WET	8"	1944	B	0	84	5
9630E	1	AUTO SPRINKLER	WET	8"	1944	A-1	0	84	6
9630F	1	RELIABLE	WET	8"	1944	B	0	26	1
9630G	1	AUTO SPRINKLER	WET	8"	1951	A-1	0	26	2
9630H	1	RELIABLE	WET	8"	1944	B	0	26	3
9630I	1	RELIABLE	DRY	6"	1944	C	1	26	4
9630J	1	RELIABLE	WET	8"	1944	B	0	26	5
9630A	1	RELIABLE	WET	8"	1944	B	0	84	1
9640A	2	RELIABLE	DRY	6"	1944	C	2	22	1
9640B	2	RELIABLE	DRY	6"	1944	C	2	22	2
9640C	1	RELIABLE	WET	8"	1944	B	0	22	3
9640D	1	RELIABLE	DRY	6"	1944	C	1	22	4
9640E	1	RELIABLE	WET	8"	1944	B	0	22	5
9640F	2	RELIABLE	DRY	6"	1944	C	2	22	6
9640G	2	RELIABLE	DRY	6"	1944	C	2	22	7
9641	2	AUTO SPRINKLER	DRY	6"	1952	39	2	25	1
9645	1	GLOBE	DRY	6"	1966	F	0	25	2
9646	1	RELIABLE	DRY	6"	1957	C	0	25	5
9650A	2	GRINNELL	DRY	6"	1946	E-2	2	21	1
9650B	2	GRINNELL	DRY	6"	1946	E-2	2	21	2
9650C	2	GRINNELL	DRY	6"	1946	E-2	2	21	3
9650D	2	GRINNELL	DRY	6"	1946	E-2	2	21	4
9650E	2	GRINNELL	DRY	6"	1946	E-2	2	21	5
9650F	2	GRINNELL	DRY	6"	1946	E-2	2	21	6

**FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS**

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	#ACCEL	TRAN.	ZONE
9620	1	RELIABLE	DRY	6"	1958	C	1		
9660A	2	RELIABLE	DRY	6"	1951	C	2	20	1
9660B	2	RELIABLE	DRY	6"	1951	C	2	20	2
9660C	2	RELIABLE	DRY	6"	1951/1958	C	2	20	3
9660D	2	RELIABLE	DRY	6"	1951/1950	C	2	20	4
9660E	2	RELIABLE	DRY	6"	1951	C	2	20	5
9665A	2	RELIABLE	DRY	6"	1952/1953	C	2	23	1
9665B	2	RELIABLE	DRY	6"	1952	C	2	23	2
9665C	2	RELIABLE	DRY	6"	1951/1952	C	2	23	3
9665D	2	RELIABLE	DRY	6"	1952	C	2	23	4
9665F	2	RELIABLE	DRY	6"	1952	C	2	23	5
9665G	2	RELIABLE	DRY	6"	1952	C	2	23	6
9669	2	RELIABLE	DRY	6"	1951/1952	C	2	87	1
9670	6	AUTO SPRINKLER	DRY	6"	1949	39	6	24	2 thru 7
9670	1	AUTO SPRINKLER	DRY	6"	1986	39A	1	24	1
9673	1	AUTO SPRINKLER	DRY	6"	1984	39A	1	175	6
9901	1	GRINNELL	WET	3"	1943	A	0		
9904	1	AUTO SPRINKLER	WET	4"	1982	353	0		
9906	1	VIKING	WET	4"	1950		0		
9907	1	GRIMES	WET	4"	1952	B-1	0		
9908	1	GEM	DRY	4"	1980	F3021	1		
9909A	1	GEM	DRY	4"	1983	F3021	0		
9910A	1	CENTRAL	WET	3"	1986	F	0		
9911A	1	RELIABLE	WET	4"	1972	B	0		
9911A	1	CENTRAL	DRY	4"	1982	K	0		
9911B	1	GRINNELL	WET	3"	1985	F2001	0		
9583			DRY	4"					
9691			WET	6"					
9690			WET	6"					
2025			DRY						
1523			FIRE PUMP	6"					

FORT LEWIS PUBLIC WORKS  
FIRE SUPPRESSION SYSTEMS

BLDG#	#VALVES	MFG.	TYPE	SIZE	YEAR	MODEL	#ACCEL	TRAN.	ZONE
1517			DRY						
5280			WET						
1410			DRY						
1325			WET						
6242			WET						
9552			WET						
NEW MAD									
3741									
9179									
3822			WET						
2095			WET		86				
6995			WET		86				
8300			WET		86				
3822			WET		86				
11A10			DRY		88				
11A12			DRY		88				
12B16			PREACTION DELUGE		84				
3E95			WET		85				
3025			DELUGE		87				
3025			WET		86				
3035			WET		88				
3106			DRY DELUGE						
3146			DRY DELUGE		86				
3063			DRY DELUGE		86				
3063			WET		86				
9908B			DRY		89				
9145			WET	4"	87				
9155			WET	4"	87				
9190			WET	6"	87				
9113			WET	6"					
9608			WET	6"	86				